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THE IRRIGATION AGE

KANSAS CITY

PUBLISHED IN THE INTEREST OF IRRIGATION FARMERS, DEALERS IN AND MANUFACTURERS OF IRRIGATION AND GENERAL FARM MACHINERY.

VOL. XXIV. CHICAGO. NOVEMBER. 1908. NO. 1

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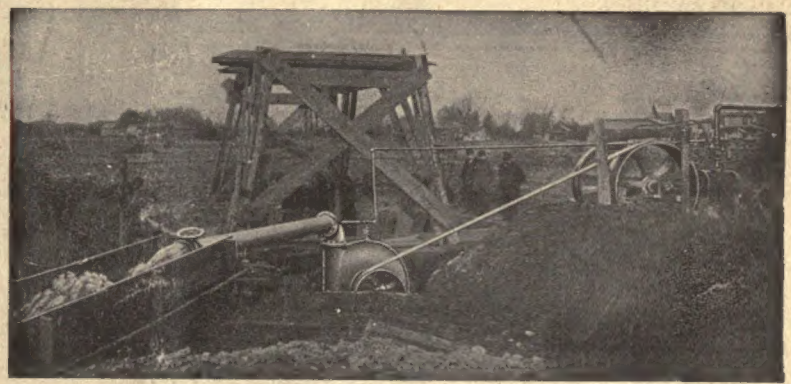

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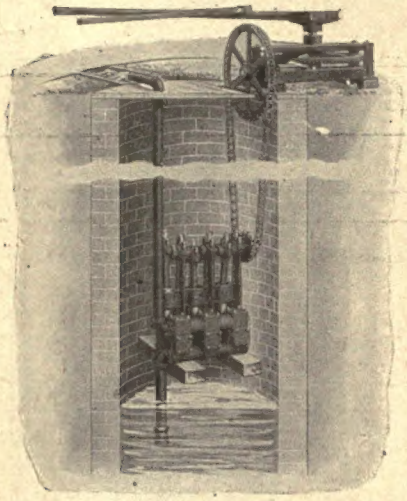

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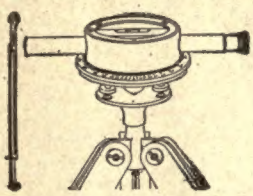

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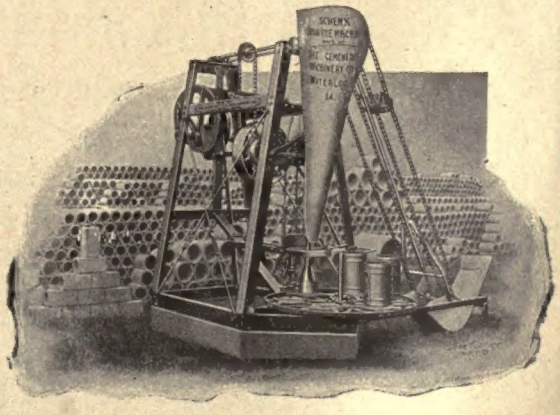

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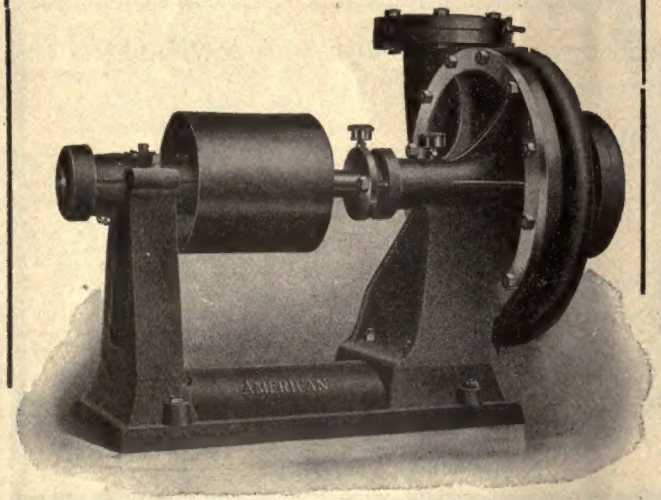

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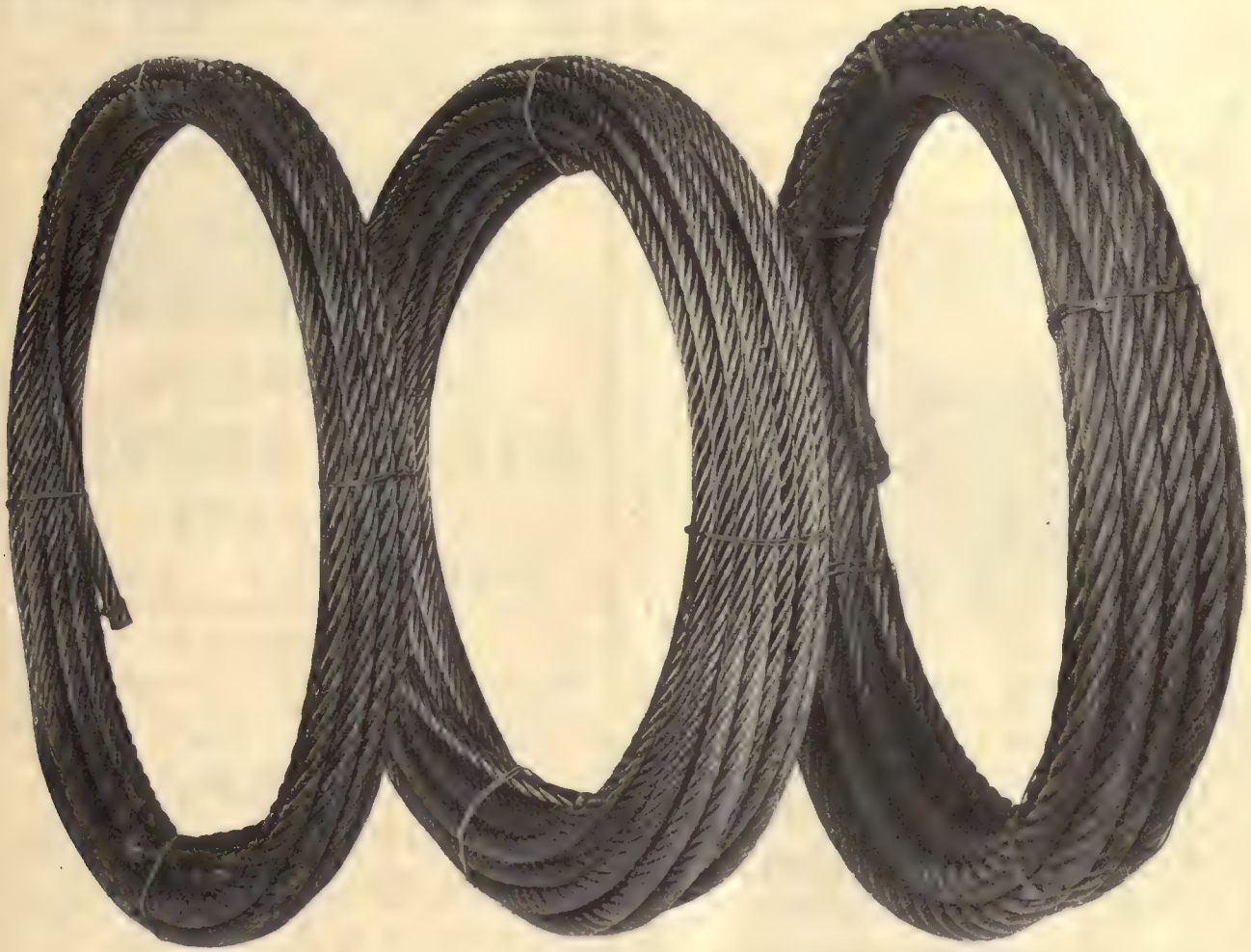

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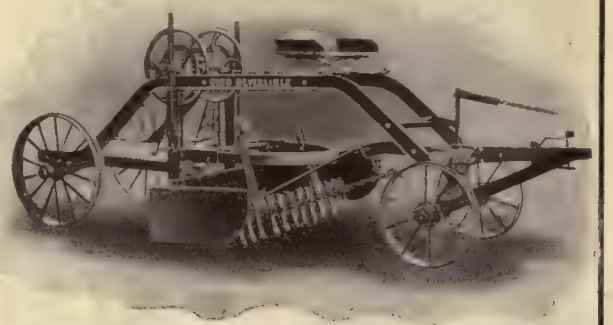

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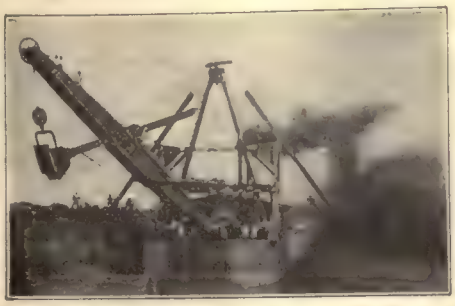

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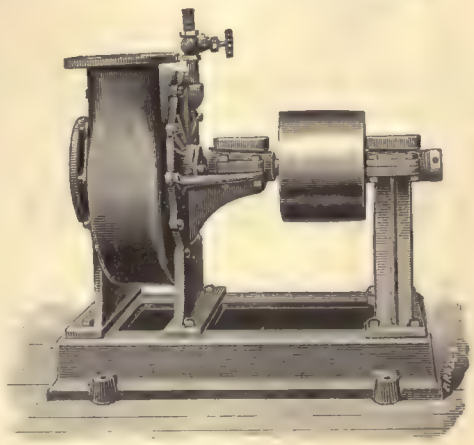

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THE IRRIGATION AGE

VOL. XXIV CHICAGO, NOVEMBER, 1908. NO. 1

THE IRRIGATION AGE
With which is Merged
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IRRIGATION AGE COMPANY,
PUBLISHERS,
112 Dearborn Street, - - CHICAGO

Entered as second-class matter October 8, 1897, at the Postoffice at Chicago, Ill., under Act of March 3, 1879.

D. H. ANDERSON, Editor

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It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 24 years old and is the pioneer publication of its class in the world.

Twenty-fourth Year.

This, our November issue, marks the beginning of the twenty-fourth year of the existence of THE IRRIGATION AGE, hence a new volume, that of twenty-four, is beginning, and our title page will show Volume Twenty-four, Number One.

The year ending October 31 has been the most successful in point of circulation building in the history of this journal. We have had representatives at work in California, Nevada, Idaho, New Mexico, Colorado, western Kansas, Nebraska and Wyoming and the results have been exceedingly satisfactory.

THE IRRIGATION AGE is being read by two and one-half times as many people today as were reading it a little over a year ago, and it is doubtful if any class publication in the United States can make and substantiate a similar statement.

This should be interesting news to all manufacturers through the United States as well as the colonization people who are figuring on developing areas under irrigation throughout the west. Judging from present indications it is our firm belief that our list will have doubled from November, 1908, to November, 1909. There is a great and rapidly growing interest in irrigation affairs. Middle and eastern states people are becoming aware of the fact that the public lands are being rapidly taken up and that those who secure land at a moderate cost must do so within the next year or two. Land in private holdings over the entire country has greatly increased in value and this is particularly noticeable in the southwest and northwestern states. There are yet thousands of acres to be secured under the different forms of entry governing the settlement of the remaining public domain, but, as above stated, these lands are going so rapidly that it is certain that a year or two more will develop conditions whereby the prospective settler will have to hunt long and carefully for choice locations. It behooves the man who has a growing family to look into the land question today and study conditions under irrigation development in the west, and this can be done more easily by regular purusal of the columns of THE IRRIGATION AGE than in any other manner.

Whose Is the Greater Interest?

The grievance of the Inyo County farmers against the Reclamation Service in ignoring their rights in favor of the demands of the city of Los Angeles, 230 miles away, is of vastly more importance to all communities where irrigation is or is to be in use than the settlement of this one concrete difficulty seems at first glance. It is of vital concern to every irrigated district in that the outcome of the Owens River valley protest against Los Angeles' taking virtually their whole water supply will establish a precedent which will settle once and for all the question as to whose is the greater interest—the city's or the rural community's.

The case of the farmers as presented before the Resolutions Committee of the Sixteenth National Irri-

gation Congress is on its face a recital of seemingly irremediable wrongs. Briefly Inyo County alleges:

First: They and their ancestors settled the valley and braved many hardships, including frequent fights with Indians, while most of California was still unoccupied by white men. As a natural consequence the present generation in Inyo County has a sentimental attachment for its birthplace, a sentiment not existing in the more newly settled communities of the State.

Second: By their own limited means they succeeded years ago in irrigating and tilling on an average throughout the valley 25 per cent of their holdings.

Third: On their petitioning the government for a survey to establish their fitness to receive the benefits of national irrigation, a report favorable to the construction of an irrigation project was made in 1903. The inhabitants of the valley, in accordance with the usual requirements of the Reclamation Service, testified to their desire for national irrigation by obligating themselves not to dispose of their lands for a period of ten years—this to prevent speculation.

Fourth: Following the assurance from the Reclamation Service representatives that the irrigation project would shortly be a fact, they awakened suddenly to the discovery that the project had been sidetracked and their watershed procured by Los Angeles. Before they had recovered from their first surprise the government withdrew 200,000 acres of their lands for a forest reserve—in spite of the fact that not a tree grew on all the big "forest" reserve and that its withdrawal worked a great hardship on owners of abutting property.

Fifth: The $25,000,000 Los Angeles Viaduct procured from the government a right of way across this forest reserve.

Sixth: After repeated requests from Inyo County for information concerning what the future held for Owens River valley farmers, the Reclamation Service finally announced that the settlers would be allowed to have sufficient water to irrigate the lands now under cultivation—about 25 per cent of their total holdings.

Virtually this means ruin for the farmer. He bought and paid for one hundred and sixty acres. By the decree of the Reclamation Service he can never till more than forty acres. The other one hundred and twenty acres must remain forever barren. And this remains the fact in spite of the plenteous flow of Owens River, which is great enough to give Los Angeles all it needs and still leave a remainder sufficient to water all the valley—under national irrigation methods.

But Los Angeles answers this statement by declaring that present day conditions are not to be considered. It is the future Los Angeles is providing against. And that future sees Los Angeles a city of one million inhabitants—a metropolis which will need all the water of the Owens River watershed.

So it happens that when new industries, seeking to locate in Inyo County, make application to the Reclamation Service for the right to build their plants on the Owens River and use its current for power purposes, the applications are sent promptly from Washington to Los Angeles, where judgment on their merits is pronounced by the city authorities. And it is hardly necessary to add the municipality thus far has condemned every application brought to its attention.

Unquestionably municipal needs outweigh the desires of undeveloped farming communities. But just as surely do the rights of the long-established, producing settlement stand superior to the ambitious schemes of a consciousless municipality, stopping at no barrier to become the metropolis of the Pacific Coast.

And after all, and behind it all, and permeating it all, the fundamental principle of fair play is involved. What is to be the outcome? Is the immigrant, newly landed in New York, to learn that national irrigation is the boon it has been described—only after the project has been constructed and the water flowing [and land values advanced beyond the reach of his purse]? Is the middle Westerner to decide that his dependence is better put in God and rain than in the government and 25 per cent irrigation?

In a word, is a precedent to be established in this Owens River valley wrong, which will result in keeping every farmer who reads—east of the Rockies, where he at least knows just what to expect?

We are inclined to think the government will adopt no such attitude. And not the least reason for this opinion is the fact that the railroads here interested themselves in the matter. The railroads are sided with Inyo County. And the railroads are not moved by any philanthropic motive.

They know the correct answer to the query, and by their alliance with the well-nigh discouraged Owens River valley farmers, they have shown their opinion as to whose interest is the greater.

A Parable.

John Smith had lived thirty years on his sixty-acre farm in Indiana. He had raised good vegetables and good children, and because of one and in spite of the other had accumulated a little fortune. Each year he marketed his turnips and potatoes and corn and hay, and with the proceeds in successive years bought his spouse the automatic piano player, the power clothes washer, the sealskin coat, and the sundry other luxuries her comfort-loving soul desired. John Smith was contented on his Indiana farm.

Of course, there had been lean years when the rain failed to come. And equally, of course, there

were yet to come as bad seasons as had gone before. But the average was pretty good—good enough at any rate to satisfy John Smith.

All this was before the multi-colored railway folder made its appearance in the Smith household. Then things changed rapidly.

"Why, indeed," asked Smith, paraphrasing the somewhat differently worded query of the pamphlet, "should I stay here on this worn-out, scrubby sixty acres when I can raise more crops and make more money and do less work in Sunny California on irrigated lands?" And the answer came a short three weeks later with the removal of the Smiths, together with such of their household goods as they could not bear to leave behind, from the old farm in Indiana to a ten-acre patch in the widely advertised Heart's Desire Valley in Southern California.

It may be said in passing, Smith had been unable to find a buyer for his Indiana farm—a fact which convinced him of its worthlessness.

According to all good rules of established parables, John Smith should have prospered exceedingly and made untold wealth in Heart's Desire Valley. But he didn't. To be sure, he raised quite as big crops as the advertisements said the land would produce. But—after he had shipped his carload of early cantaloupes he found the expense bill was 87 cents bigger than the check the consignee sent him for his produce.

Presently a big city, 300 miles away, determined to increase its water supply to provide for the day when it should have doubled twice in population. The watershed on which the Heart's Desire River had its source was chosen as most suited to the city's future needs. The government suddenly took a hand in the little game which was progressing merrily—and entirely unbeknown to the settlers in the Heart's Desire Valley. Thousands of acres of tree-less land were withdrawn for a forest reserve—land on which Smith's cattle had grazed free. The great city viaduct was to have a right of way across this reserve. The Heart's Desire River was to be reduced 75 per cent in flow, the government announced at length.

And Heart's Desire Valley looked more like an ant hill kicked open by a careless range heifer than the happy, prosperous community it had resembled.

John Smith got out with the clothes on his back and returned with his family to the old farm in Indiana—in a chair car. They had traveled West in style—in a "tourist."

MORAL.

It's better to raise turnips with rain in Indiana than cantaloupe with irrigation in California—if the Reclamation and Forestry departments of the Government are allied against the settler.

The Art of Irrigation

CHAPTER SIX

By T. S. VAN DYKE

If your soil is not too hard and tight and you do not apply the water too deep or too often you can hardly fail to find flooding profitable in spite of the sickly appearance of things at first. At the same time you may have a strong suspicion that the growth is not what it should be or that the quality of the product is not first class.

Well, who told you that you must flood? It is not always the best way and is generally the worst way to irrigate. If you have a rich vegetable mould its loose character and the stimulus of the nitrogen in the humus may enable it to overcome the effect of flooding. For garden work the same can be done by plenty of stable manure well mixed into the soil. An amount that would burn up almost anything under dependence on rain can be put in with safety and for many crops it can be used raw. On the desert it is so difficult to rot it that it must generally be used raw. I have found turnips, carrots, radishes, lettuce, beets and corn thrive wonderfully under six inches of raw stable manure. The same killed onions, tomatoes, peas and beans, made potatoes and cucumbers sick no matter how much water they were given, stimulated melons to an early crop and began to kill them before it was fully picked, etc. But all stand a much larger quantity of manure than under farming with rain alone, no matter how badly it is worked in. With such fertilizing I find flooding indispensable for most things on the desert, for the top soil must be sealed over to close out air spaces, which in dry air and under a hot sun will either dry out the seed before it sprouts or kill it afterward. This cannot be done by rolling, for the ground dries too deeply in spite of it and if planted deep enough to avoid that then it is too deep for most things. By flooding I can plant seed only an eighth of an inch deep and get a perfect stand, where without it I cannot get one per cent of slow seeds like carrots or lettuce, no matter how deeply planted or how well rolled. One should experiment at once on these things even though in a land of considerable rain, for deep planting may retard growth even where it does not stop it. I find melons just covered stronger and better plants in every way than those covered two inches. By using seed sprouted under glass I can get sixty per cent with one irrigation. After that they are safe for a month if the ground has been well filled with water.

Still there are good reasons for flooding which you may not be able to ignore. But first let us consider a modified form of it—flooding with moving water and commonly called irrigating in "Lands."

So far we have considered only standing water confined by levees on all sides. But if a narrow strip be confined on only two sides by levees such strip may be made quite long, provided the slope is great enough to keep water moving after it is well filled with vegetation. These are very popular in many sections and where the slope is so great as to make good checks expensive they are the best form of flooding. They are

made of all lengths from a few hundred feet to nearly half a mile, though a quarter of a mile is nearer the extreme. They vary in width from about sixteen feet to twenty-five or more. I have some fifty feet wide that work fairly well, but they are only three hundred feet long. When wide it is most too difficult to get them level on the bottom, that is level laterally so as to prevent the water from sliding off to one side or running in a dish down the center. Twenty feet is a better width for alfalfa, while for melons and other garden stuff I find ten wide enough.

It is a mistake to make them too long, as it takes too long to get water enough to the lower end and keep it there long enough. Too much of the time water is wasting by soaking in at the upper end after it has soaked enough. Considerable must also run off at the lower end so as to insure wetting it well. It is better to have them shorter, collect the waste water in another cross ditch and run it in a new set of lands. Checks must be prepared to take the final waste or some ground will be left too dry. Six hundred feet is about the limit of officiency on most soils unless there is plenty of water to waste. The slope should be six inches in a hundred feet to insure good running, and a foot is better yet. When vegetation is heavy, still more is better, but care must be taken in all cases about the soil cutting when the ground is first planted.

The levees for these lands do not have to be so large as for flooding in checks. But when ground is well covered with vegetation it makes great resistance to the passage of water. The levees should be large enough to force the water in spite of all resistance and so strong that one cannot break and let the water into the next one. If it does you may have a dry strip below and have to haul in earth with a wagon to make repairs.

Neither do the gates have to be made with the same care as for checks because the lands are so narrow that large heads of water are not used, that is, large compared with those generally used in checks. It is not difficult to set several lands with the inlets about on a level so that one cross gate in the ditch will supply them all at once. Sometimes they are set so that the water does not enter until raised by the cross gate. Then when it is opened to feed the next lot of lands the water falls as it flows on so that the first lot of inlets do not have to be closed at all and need no gates. Sometimes it is best to start at the lower end and work backward, closing cross gates instead of opening them. And often you can work both ways, one way at each irrigation. It will all depend on the lay of the land and the amount of water you are running. If you have a good slope the way the lands run, with the ground nearly level on a line at a right angle to it, you can do it almost as you please if the lands are not so long or so wide as to take too much water.

One feature of this method is that you can hardly get the water too deep—a great advantage where you have to flood in gardening. Nor do you have to watch it very closely as it can do no harm except to waste at the lower end. The levees are not liable to be broken by waves as in checks, nor can gophers make much of a home in them as in larger ones. You have also a perfect clearance with a certainty of no stagnant water if they are laid out on uniform slope. This means no scalding of alfalfa or other vegetation unless you make a special effort to insure it. It takes some care, however, to keep a uniform flow in several lands. If not you have to leave some running after the others are shut off and this may require gates that might otherwise be dispensed with. Careful grading of the slope is more important than in checks. The water is flowing, and flowing in a thin sheet, so that if a spot is too high it will collect rubbish and split the stream, often leaving a dry spot. And if a spot is too low it may, after being well soaked, hold water long enough to injure something the same as in a check with water too deep. The surest way is to have the levees high enough to force the water, and water enough to be forced, and then collect the waste below and use it over again. Another advantage of this method is where you have short heads of water, or cannot run them a long time, you can cover more ground than you can with checks that are as cheaply made. But unless the ground has a long and easy slope, needing very little grading to make it uniform, with fall enough to insure a fast run of water against a heavy stand of vegetation lands will not be as cheap or efficient as small checks might be.

To flood or not to flood is therefore the important question at first. And on its proper determination will depend much of your success as well as comfort in your work. With the right system selected and properly laid out you should spend much of your time in the hammock. Otherwise you may be hopping about all day with a shovel wondering why there is so much work for so small an area. In considering this question the two systems, standing water and running water, will be treated together as they differ only in the ways above mentioned. To the following principles you will find hardly an exception. Apparent exceptions are in the wrong application of the principle.

First.—For handling large heads of water on a large area flooding is the cheapest method, if slope is not too great.

Second.—Where soil is so porous that water runs in small furrows sinks in too fast, or sinks directly downward instead of soaking sideways, flooding is generally the only way to insure quick and uniform wetting.

Third.—Where soil is so tight that soaking from furrows is too slow flooding must generally be used, but with great care because on such land drainage is probably bad.

Fourth.—Where your water supply is limited to a short run of a big head flooding is often the only way you can get it over the ground within the time limited.

Fifth.—Where the slope is so light that water will not run fast enough in furrows flooding in large heads is often essential to quick work.

Sixth.—Where you have to take your turn at the water in the night you can often arrange things so that one check will feed another and pass on while you are in bed. But if your crops are very valuable, and especially if water is scarce, you had better stay up and take care of it under any system. If you have to go on a night run this time the ditch tender will put you on for a day run the next time if possible. Where the run lasts much more than a day you can generally arrange furrows to run all night without watching. Such is the case now in about all the orange orchards in Southern California, where the run is rarely less than three

days and nights and sometimes four. In a few places in Orange county the old method of flooding in checks about twenty-five feet square is still used because the soil is too porous to hold up water far in furrows. A line of a dozen or two is fed from a ditch at the upper side and about the time the last is full they commence breaking them and letting the water into the next line, then into the next and so on. This takes about three men six to twelve hours for ten acres with a head of two or three cubic feet a second. Three second feet will equal three rain inches on ten acres in ten hours. This takes lively work for a short time. With furrows the same amount of water may be put in the ground with a smaller head by one man working less than half his time and generally producing better fruit. But it may take much longer time at each irrigation, though less during the year. But there is much of this soil in all countries where furrows will be too slow if your time limit for the run of water is short, so that flooding is the most available method, though not the best for results.

Seventh.—Flooding is sometimes the only way you can start seed. Especially is this the case on desert land. It has been the custom to smile at those who live on the desert. But there is too much of it, now producing too much wealth, to laugh at. One learns to love the desert climate, scenery and elbow-room, gets quickly used to the heat, which is so dry that it is not oppressive, especially at the altitude of most of our deserts. They are already supporting in luxury large settlements and will in time be the richest parts of our country for the same area. The lessons to be learned from them cannot only be applied to sections having a good rainfall, but many such lessons cannot be ignored. I must beg the reader's indulgence for referring so often to my own ranch, but he will pardon me if he will remember that I have nothing to sell or recommend and no time to answer any letters. After twenty-five years' experience and observation in the best parts of California I have learned more in seven years from opening up a new place myself where others failed than I did in all the previous time. And what I have so learned is more valuable to the beginner on new ground and in new climate. But most of the lessons are valuable anywhere.

I am situated in what is probably the dryest part of our country—that part of the Mojave Desert lying along the Mojave River, some forty miles west of its sink. The elevation is about two thousand feet, average rainfall about four inches, often less than three and that only in winter. Temperature in summer 116 occasionally, but seldom over 112 and rarely below 100 except at night. Moisture in air about the extreme minimum of the world.

I have soil of several textures, from near clay to the coarsest gravel. In spring when it is windy much of the time, and in summer when it is hot but rarely windy, I find it almost impossible to get a decent stand of anything without flooding. The moisture cannot be kept long enough at the immediate surface, even for seeds like alfalfa (which is up inside of five days), unless the surface is sealed over. My first planting of alfalfa was in the most orthodox manner, with deep plowing, fine harrowing, and immediate seeding and harrowing in on soil wet many feet deep. I got about one plant to a square rod from about thirty-five pounds of seed to the acre. I concluded that air spaces drying out the soil under the hot sun and dry air had done the mischief and that if the seed were drilled in shallow on unplowed ground so dry that loose dirt could be easily dragged back over the seed by the chains that trail behind the feeders of the drill, and the whole then sealed over by flooding, that I could get a stand in spite of the hardening and tightening of the soil. The ground in the other case had been irrigated by furrows and they were run for some time after planting without effect, except in the bottom of the furrows, with a few scattering plants along the sides. But now I rushed a big head over the whole patch; in five days the young plants were lifting the thin crust in every direction; and I had a stand about three times too thick, although I had planted the smallest amount of seed the drill would feed—about fifteen pounds to the acre, or half of what is generally deemed necessary for sowing broadcast under good conditions and culture.

I have found it the same in greater or less degree with about everything else. Even such a simple thing as a carrot I could hardly raise at all with furrow irrigation, but by thin flooding in lands I can raise at least twenty tons to the acre and am sure the yield has been above that. But this was on heavily manured ground. The natural soil is not rich enough, no matter how wet. But on that the seed would dry out unless sealed over by flooding, and on the manured ground it would not only dry out before sprouting but do it more quickly than on ground not manured. And the little that would start at all in that way would soon burn out unless flooded. I have not tried this with artificial fertilizers, but it is probable that there would be something like the same results. And it is also probable that to some extent it would be true in a dry time in summer even in a land of good rainfall.

One year I set out over 200 sweet potato plants with furrows close beside them, ground well wet and plants well shaded from sun and wind. I lost every one. The next year I set 300 in bottom of furrow without shading and kept water running four days, and every one grew all right.

The beginner on a new piece anywhere should study these points as fast as possible.

Thus far I have been considering irrigation that is indispensable for any crop, as on the dryest parts of the desert. But all of these principles apply about as well where the irrigation is only supplementary to a rainfall just a little short of what is needed for good results, as in the greater part of California. And they cannot safely be ignored anywhere that irrigation is expedient, though not really necessary. If great results can be obtained anywhere in our country by intensive farming with rich fertilizers and fine cultivation it is almost a certainty that still greater results can be had by applying the right amount of water at the right time and above all in the right way. And that, after all, is what irrigation is. Irrigation is commonly supposed to be a poor substitute for a good rainfall. Years of experience will show you that it is just the reverse, and that the best rainfall in the country is a very poor substitute for irrigation.

The National Forests and the Forest Service.

By Judge D. C. Beaman, Denver, Colo.

[Continued from October number.]

If he would confine the Forestry Bureau to its legitimate purposes, as does the Weather Bureau, it would be as popular and valuable to the people as the latter.

The outrages perpetrated by subordinates in hundreds of cases, are by him excused because he cannot, at the prices he pays, always get good men. A sufficient answer to that is, that it is better to have no men than to have bad men.

It is unfortunate indeed that any good work that Mr. Pinchot has done, and might continue to do, has been so overshadowed by unwise administration, and regulations wholly unnecessary to the protection of the forests, as to cause political parties to make it an issue in their platforms.

It has been often stated in newspapers which are blind supporters of the forest policy, that it is in perfect harmony with the wishes of a vast majority of the people concerned; that as rapidly as possible Mr. Pinchot corrects all grounds for complaints arising from vexatious and disagreeable acts of over-officious subordinates, and that a man who has a real grievance should communicate with him so as to enable him to correct it.

This is a subject which neither the personal experience nor observation of most of these editors fit them to discuss—their forest experience having been chiefly acquired in the potted forests in the palm rooms of the metropolitan hotels and city clubs—and in doing so they utterly ignore facts that have been proven beyond dispute. They are evidently based on statements of the self-laudatory bulletins put forth by the Forest Press Bureau, and sent broadcast over the country and reprinted in these papers as original editorials or correspondence.

The complaints of the people are not so much because the forest employes obstruct the homesteader and the miner, as because the rules governing forests compel them to do so. Mr. Pinchot is the chief offender, and instead of his policy being in harmony with the wishes of those chiefly concerned, the very opposite is true. There is, and has been for several years, a hostility thereto constantly growing in intensity, which has only been restrained because the power of the government is behind the policy, and those who are the sufferers are helpless to secure justice.

No policy of recent years has done so much to alienate the friends of the government as the mistaken policy of the Forest Service in these respects, and if any of the mountain states shall go democratic this fall, it will be chiefly for that reason. If a state government had treated its people in such a manner, it would have been ousted at the next election.

It is supremely silly to make the assertion that the people generally are satisfied, when the recent platforms of the Democratic Party, National as well as in Colorado, declare to the contrary, and the Republican platforms of Colorado and New Mexico are of like effect. It will not answer this to say that the Republican platform in Colorado does not directly condemn the policy. It favors an administration of forests "which will not retard our natural growth and development," and declares that the national government is not familiar with actual conditions. This is not an approval, but by strongest implication an affirmation that the present administration does retard growth and development, and a condemnation of it by the Republicans of Colorado.

It is equally useless for a man to attempt to communicate with Mr. Pinchot for any relief. The communication will probably never reach him, but if it does, it will do him no good.

Not content with discussing forest questions, and boosting itself, the Bureau has a bunch of experts employed in advising those who live near the habitats of wild animals, as to their habits.

The profound knowledge which is put forth in some of these bulletins, telling us how to conserve our resources and save the nation, is simply wonderful. In a recent one it was seriously stated that "a good way to exterminate wolves is to find the dens and kill the young ones." This method has been known to pioneers for some time, although some of them think that to kill the old ones before breeding time is quite as effectual.

One of the very latest is on prairie dogs. The Forest Service has recently discovered that poison will kill them if administered internally—not hypodermically. It is scientifically estimated that 256 prairie dogs of average appetite will eat as much grass as one cow; that proper soil will yeild about twenty-five and one-half dogs to the acre (this is probably half a dog too much), and that there are in Texas enough dogs to eat as much grass as 1,000,000 cows. This dog-goned slap at Kansas, so long the banner prairie dog state, seems uncalled for.

It would seem that the time and talent of the Bureau might better be employed in correcting abuses and vicious rules than in compiling prairie dog statistics, so long at least as these dogs do not inhabit the forests or eat the timber.

Besides the numerous other calamities which Mr. Pinchot warns us about in his hysterical moments, is that a billion of tons of our soil is going into the streams and ocean annually. Where the data is obtained for this estimate of tonnage we are not advised, probably from the catfiesh, which should know most about it.

Has Mr. Pinchot forgotten, or would it have dulled his point to have also stated, that ever since the earth cooled off, disintegration of the rocks and erosion has been going on, and that the amount of soil has been constantly increasing; that the wash and erosion into the Mississippi river has formed much of the two great states at its mouth, and that all the plains country of the West was made from the rocks of the mountains?

There are, no doubt, some regious where soil erosion has rendered a few acres of land almost, or quite, valueless, but it is equally unquestionable, notwithstanding these isolated cases, so vividly photographed and emphasized in the bulletins and magazine articles of the Forest Service, that as the rocks disintegrate the proportion of arable soil increases until the soil area now comprises more than 90 per cent of the land.

This he proposes to remedy by preserving the forests in the mountains, and, therefore, according to

him, the Forest Service is to be the savior of the country in this respect. The truth is that the rains which produce the greatest floods do not fall in the mountains, as the heavy rains there are usually short; the rivers in the mountains are not generally high at the times when the greatest flood destruction is wrought. These storms are almost wholly in the plains country, the result of long and incessant rains, and these floods can only be prevented by the construction of reservoirs of sufficient capacity to retain the surplus water, and that must be the final remedy against enormous rains which forests cannot entirely restrain.

The greatest floods that Iowa ever had were in 1851, when the country was but sparsely settled, and no timber of any consequence had been cut.

Mr. Pinchot will have to invent some means to stop the rain when it is not needed, before his plan of salvation in this respect will be water proof.

As to the use of timber in the earlier days, Mr. Pinchot complains that the tops of the trees were left unused in most cases, and this he calls a waste of resources. All this, he says, the Forest Service has changed, cutting only mature, dead or dying trees, and utilizing every part of the trees for cord wood, etc.

It has been generally believed that the early settler did not cut trees for sport, but, on the contrary, used every part of every tree which his conditions required. He had no market for cord wood, hence he left the tops, using only that part of the tree which he needed for his cabin and fences. It will now surprise him to learn that he cut and wasted vast quantities of timber for fun, when he really supposed he was in earnest, and trying to make for himself a farm and home.

I have quite recently spent some time in the Uncompahgre forest. It is yellow pine, averaging not more than ten trees to the acre, where timbered at all, with thousands of acres not having thereon a tree of any kind. It is sparsely inhabited, and not a tree should ever be cut in it if snow and water conservation is to be chiefly considered. Notwithstanding this, the sawmill is doing its work, and about one-third of the yellow pines is being made into lumber. The tops are not "utilized," and this for the very same reason that the early settler did not do so—there is no market where a price can be obtained equal to the cost of cutting and hauling cordwood.

I do not criticize the non-utilization of the tops. What I do say, however, is that the Forest Service is in this respect, as usual, preaching one thing and practicing another.

In fact, nothing is wasted in the true sense, if it cannot at the time and place in question be economically utilized.

In all other forests the sawmill is active, and in most of them scattering trees are left for reseeding. These unprotected seeders have nearly all been blown down by violent storms, frequent in the mountains, while in the adjacent untouched forests, but few are prostrated, as the solid forest can resist these winds more successfully. Where the cutting has thus been done under so-called "scientific forestry," the forest in many places is practically annihilated.

But perhaps his greatest complaint is over the cutting of timber near mining camps where there is no question that great areas were cut over and little timber left.

At Leadville, Colorado, during the last thirty years, approximately 100,000 acres of timber were cut for use in building, developing the mines and making charcoal for the smelters. Such things are now declared to have been wasteful and wrong, this timber should have been "conserved for posterity."

What has been the result to us and our day and generation? From this wasteful destruction has come a city of 30,000 industrious thriving people, who have produced nearly $500,000,000 of precious and other metals, the value of which has gone into the commercial world.

We ourselves—and as these values are practically indestructible, our posterity, have thus obtained for each 1,000 acres of trees, 300 men and $5,000,000 in treasure.

Compare this with the value of these trees, and how much will there be to the credit of the "conservation" idea?

This condition has come about in hundreds of cases throughout the Rock mountain mining regions.

Senator Teller never made a more important or truthful statement than that he made at the Public Lands Convention in Denver last year, to the effect that "men are worth more than trees."

Mr. Pinchot at first charged the early settlers with the fires that also destroyed large forest areas. Since then he has become better informed, and in his 1904 report, he states in relation to the Pikes Peak reserve:

"That the most serious fires took place at least fifty years ago."

There were Indian and lightning fires before the settlement of the country, as were most of the serious fires in the Rocky mountains, as every old settler well knows.

If fifty years ago our coal, iron and timber had been looked up, as Mr. Pinchot and some others higher up now claim should have been done, we would have had no "great West." No more can such a policy be pursued now, save at the sacrifice of the development and progress of the nation.

It has been repeatedly and publicly charged by myself and others that personal observation, as well as the reports of the Forester, show that more timber has been sold and cut under the Forest Service than ever before in the Rocky mountains; for instance, in Colorado in 1907, over 70,000,000 board feet, and in other states even greater amounts, and that the main object of the Forest Service was to make the revenue from the forests equal the expense of administration.

I have been recently informed by a forest supervisor that the policy of the service as to allowing the cutting of so much timber has been radically changed, so that much less is now offered for sale and will be hereafter cut than formerly, the sales being limited to local needs, and mostly confined to dead timber. Is it possible that the charges above referred to have been taken notice of by higher authorities in Washington, and Mr. Pinchot called down? If so, much has been accomplished.

Whether this is so or not, the change is a confession that the former policy was wrong, and a condemnation of it.

To me the logic seems unanswerable that every living tree cut necessarily lessens the conservation capacity of the forest.

Over and over again we have been informed by the Forest Service bulletins of the great work mapped out

by it in the reforestation of the Rocky mountains, and how the forests were to be so taken care of that successive timber crops were to be harvested. In the Red Book entitled "Use of the National Forests," is the following:

"Agricultural lands are managed so as to produce the most valuable crops, year after year, without a break. Forest lands also should be managed so as to produce the most valuable crops of timber and wood year after year, without interruption."

This feat is to be performed, so far as the public has been advised, by preparing nurseries which are to be seeded, and when the trees are of sufficient size they are to be transplanted to the forests.

The following is a quotation from a forest supervisor's report for 1907, a copy of which I obtained from the Forest Bureau at Washington. Out of sympathy for the subordinates concerned, I omit the name of the station and the forest, as they no doubt realize how useless it is to attempt reforestation by such means.

"Nursery and Ditch.

A nursery was plowed and fenced at ..... ranger station in May of this year. This nursery is 135 feet long by 45 feet wide, and is fenced with four barbed wires strung on posts 16 feet apart. Six seed beds were prepared and planted this spring, each of them being covered with a shade frame made of lath nailed on 2 by 4 pieces 12 feet long and placed on stakes about 18 inches high."

When the Rocky mountains are reforested by means of nurseries the size of a town lot, the miracles of the Bible may well be forgotten, and we may console ourselves that the food famine is indefinitely postponed so long as the Forest Service can annually procure five loaves and two fishes on which to feed the nation.

In theory, timber cutting under Forest Service supervision is confined to mature, diseased and dying trees. If Mr. Pinchot would visit these regions on horseback, instead of in a Pullman car, he would learn more about our forests in a week than he ever knew before. He would learn that there are no "mature" pine or spruce trees in our mountains, nor will there be for no one knows how many hundred years; that a majority of them are less than 1,000 years old, but there are some that are 1,500 years old and growing as thrifty as ever.

There are in many places dead and dying trees, not from age, but from injury and disease.

In our forests which are at an average altitude of 9,000 feet, there are but about three months in the year, and but about six hours in each day of these months, when the trees will grow; the soil is generally rocky and thin, furnishing but slight nourishment, and the average of tree growth under such conditions for each twelve inches in diameter is for red spruce 200 years, white spruce 400 years, yellow pine 200 years, and lodge pole pine 300 years; therefore the second natural crop of saw timber which the Forest Service is promising us, as a great feature of scientific forestry, will not be crowding us and our posterity during the next 500 years.

In low altitudes where the trees grow the year round in rich soil and under equable climatic conditions, pines will grow to twelve inches diameter in twenty years, but this is in nowise a standard from which to judge growth in the Rocky mountains.

But the Forest Service is proposing to outdo nature, if we are to take its promise for performance.

Quite recently the following prophecy was put forth:

"Following out the plan to preserve and replenish the forest reserves of the country, the members of the Forestry Bureau will, within the next few days, begin the planting of 100,000 trees in the neighborhood of the Cheeseman dam and in the Tarryall mountains, along the South Platte river. This is only the beginning of a gigantic scheme to plant 20,000,000 trees in a tract of 100,000 acres in the Pikes Peak forest reservation.

"This new forest will result in millions of gallons of water being saved to the city of Denver and to the State by the checking of the heavy volume of water that now goes to waste in flood periods.

"Julius F. Kuemmel, who has charge of the planting, says that benefit will begin to be derived from the new forests in about ten years."

Let us see when this second flood of water will come. After these trees have spent five or ten years in a nursery, they will be ready for transplanting to the forests. It is safe to say that the operation of taking up, transportation to the forest and replanting will average one hour to the tree; this will require 2,500,000 days of eight hours each, and allowing 300 working days in each year, it will take 100 men eighty-three years to do the job! It will take about forty years after planting for the trees to attain a foliage spread sufficient to conserve snow and increase the water supply.

According to Mr. Pinchot's forecast on our resources, our coal, iron ore, etc., will all be gone in less than 100 years. What, then, will we do with all this water? Of course, as a hope that our posterity may not have to build a second ark, we may rely somewhat on the statement of equally eminent scientists that these young trees, in order to grow, will each require a natural or artificial supply of water of about one gallon, or a total of 20,000,000 gallons per day from the time of transplanting. Just how this will help the water supply of Denver in the first instance we have not been advised.

When in Colorado last month, Secretary Wilson used his eyes and ears, and acquired considerable information as to conditions and among other criticisms of the forest administration, is reported to have declared the scheme of reforestation by hand to be absurd.

If Mr. Pinchot had more mountain experience, he would see that natural reforestation is going on as rapidly as can be wherever moisture and soil conditions permit, and that unless these conditions are favorable, reforestation is not possible, either naturally or artificially, the fact being that all over the mountains where the timber was destroyed, either by the axe or fire twenty to fifty years ago, natural reforestation is going on, and these areas are now thickly set with new growth from 3 to 20 feet high, and nature is accomplishing more every year than the Forest Service will accomplish in the next thousand years, and the idea of reforestation in the Rocky mountains, by human hands, is a dream that will never materialize.

In this respect, as well as to our resources, Providence has up to date taken fairly good care of us, and as between the two P's—Providence and Pinchot—a majority of the people will still tie up to Providence.

A CASE FOR MR. PINCHOT.

I could, from my files of correspondence, present to you more than 100 cases of flagrant abuse of the rights of homesteaders, miners and prospectors, by the Forest Service, but time forbids, and besides they would be waived aside as unauthorized acts of subordinates. I will, therefore, content myself with presenting one only, but it is one for which the head of the service is directly responsible, and is of unusual importance, and far reaching consequences, not only to the individual wronged, but to every citizen of a forest state, and I ask Mr. Pinchot or his proxy here to defend the action before this Convention if he can.

I am authorized to speak for the man concerned.

September 10th, 1906, A. J. Porter, a respectable citizen of Colorado, applied for a homestead in the White river Colorado forest. Mr. Pinchot wrote him that he would have it examined but there would be some "necessary delay." In January, 1908, sixteen months afterwards, he was advised by the "Acting Forester" that examination had been made (by a ranger), and in the letter it is stated:

"This land is open park, covered with mountain bunch grass, and owing to the shortness of the growing season, is ony valuable for grazing. It is not the policy of the Forest Service to classify grazing land as chiefly valuable for agriculture. I regret to inform you therefore that your application must be rejected."

The applicant is a reliable man and says that the altitude is about 8,000 feet; that timothy, oats, wheat and barley will grow there, and as many of you no doubt know, such crops are successfully grown at that altitude on hundreds of farms in Colorado. I know the ground, and that his statement is true.

He also says that there is a large area there without a tree, and with water available, which would all be settled on at once if people were allowed to do so, but his application was rejected without a hearing or an opportunity to produce witnesses to show that the forest ranger on whose judgment, or lack of judgment, Pinchot acted, was mistaken.

Ever since the first U. S. Land Laws were passed, grazing has been recognized as a branch of agriculture.

In a circular issued many years ago by the General Land Office, in relation to homesteads, is the following:

"In grazing districts, stock raising and dairy production are so nearly akin to agricultural pursuits as to justify the issuance of patents upon proof of permanent settlement and the use of the land for such purposes."

In August, 1906, just before this application was filed, the General Land Office issued a new circular, in which it is said:

"Lands covered by homestead entry may be used for grazing purposes if they are more valuable for pasture than for cultivation of crops. When lands of this character are used in good faith for pasturage, actual grazing will be accepted in lieu of actual cultivation."

Thus more emphatically, if possible, showing that grazing is deemed an agricultural pursuit.

In the Forest Use Book of 1907, under "Agriculture," is the following:

"Homestead claimants are required to live upon and cultivate or graze lands embraced in their claims."

This was in force when the letter was written rejecting the claim, and Mr. Pinchot not only undertook to reverse the policy of the land laws, but actually violated the regulations promulgated by himself!

In the new Use Book, however, taking effect July 1, 1908, the words "or graze" are omitted from the above sentence, showing the rejection of the claim was in pursuance of a new policy to be hereafter enforced in National forests.

Is there any officer, other than Mr. Pinchot, who would thus assume to change the policy of the land laws according to his fancy? Yet Mr. Pinchot says this suits the majority of the people, and also says in his Red Book that:

"A national forest does not in the least shut out real settlement. It encourages it."

Again it says:

"What happens to the homeseeker? When a National forest is created, the homemaker is not interfered with in the least."

Oh no, he is not interfered with when he has to wait sixteen months to know whether he can get his claim approved, during which time he cannot even pitch a tent or cut a fence pole. And I now ask you and Mr. Pinchot if these Red Book pretenses are true or false?

But this is not the whole story. Ever since our public lands were opened for entry, one, whose application to enter was protested, was given opportunity to produce witnesses and have a hearing to determine his rights, and the right of appeal if decided adversely to him. The same procedure still obtains in all other controversies concerning human rights, except in Mr. Pinchot's tribunal, where the fundamental principles of common sense, common law and common justice are disregarded and a subordinate's decision is final and without appeal. The Lord help the homesteader who must rely for "encouragement" on the Forest Service and on the editors of some Republican papers for aid in maintaining his rights.

This case, however, presents a much more serious question than the mere attitude of such newspapers, or an injustice to one homesteader. If this ruling that grazing is not agriculture, and an applicant can have no opportunity to prove his contention that grain crops will grow on his claim is to stand, it explains his failure to include reclamation of lands suitable for agriculture in forest reserves as a part of his plan to relieve the coming shortage of food, and it not only "retards" development in the West, but practically ends homestead entries on forest reservations.

This is considered by many as more important to western forest states than the election of a governor or a president, and our members of Congress should see to it that such a policy is not allowed to stand.

That there be no question of doubt, I have here the original of these two letters, and they may be read by any one desiring to do so.

I doubt very much if this radical and indefensible change of policy has ever been brought to the notice of, or directly approved by Secretary Wilson.

It has been stated that Mr. Pinchot is not coming to this meeting, having been appointed on the Committee on "Country Life," which is to report and advise our farmers how to lead a simple life and enjoy themselves. I suppose Mr. Pinchot, having been born and lived in a city, will find it easy to recommend that these farmers quit cutting hay and raising potatoes, and buy an automobile, ride out to a country club and play tennis.

It has also been stated that Mr. A. F. Potter, Chief of Forest Grazing, is to be Mr. Pinchot's proxy at this meeting. If so, I have a case for him—one strictly in his line.

Early in 1907 there was an intimation that grazing fees in Colorado forests were to be increased, and on account of this there was general dissatisfaction and disposition to refuse the payment of fees. In order to allay this feeling and induce stockmen to submit to the collection, the following letter was written by Mr. Potter to the supervisor of the Gunnison forest, and given out for publication:

"No Change in Grazing Fees.

Board of Grazing, Dep't of Agriculture,
Washington, D. C., July 1, 1907.

William P. Kreutzer,
Gunnison, Colorado.

Dear Sir:—

In reply to your letter of June 11, you may inform the patrons of the forest that the grazing fees as charged at present will not be changed and will remain the same during the reign of the present administration.

A. F. Potter, Chief."

In the third edition of the "Use Book," issued July 1, 1908, and now in effect, the scale of grazing fees is raised about 40 per cent by Regulation 55, and an extra charge of from one to five cents per head in excess of any former charge for extension of season permits to yearly ones.

It may be that grazing fees have not yet, in practical effect, been increased, but the new scale is in force and, of course, this advance was not made without some purpose, and no doubt the raise will come shortly. The price of timber has also been increased.

The foresight of Mr. Pinchot is here shown. The last Congress increased the per cent of forest revenue to be turned over to the states from 10 to 25 per cent, and, no doubt, this increase in fees and the price of timber was intended to make up, in part, for this loss to the Forest Service by imposing the additional burden on the users of the forest.

Quite recently an officer, referring to the fact that the forest states were soon to receive their per cent from the Forest Service, said:

"It is with great pleasure that I am able to inform you of this direct contribution of the National forests to the counties in which they are lying."

He, however, omitted to state that this sum was first extracted from the users of the forests, and retained about a year after it was collected. As soon as this new thumb screw on grazing fees and timber prices gets in action, the people who are "pinchees" will be entitled to still more fervent congratulations—and grief.

Mr. Potter hit the bull's eye when he called this forest administration a "reign," as nothing like it was ever before heard of in a republic. But who is "reigning" now? If Mr. Pinchot is still enthroned, how about this previous promise of no raise during his reign?

This violation of his promise further supports the contention of opponents of the forest service as administered by Mr. Pinchot, that his promises and performances are different things.

Finally, I do not want to be misquoted or misrepresented as to my position. I recognize some good in the Forest Service, even as administered by Mr. Pinchot and blindly supported by many others, and I repeat that I am not criticizing forest reserves, nor forestry, nor the Forest Service, except where it works injustice, and is a sham and a false pretense, and endeavoring to deceive the people.

A prominent Republican said to me that the delivery of such an address as this at this time is not good politics. That may be so. But it is just as good politics as some things that have been doing recently farther east, and also as good politics as the cause—the Pinchot policy. The way to get this question out of politics is to remove the cause.

This ought to be, and can be speedily, done, and when done the Forest Service will be wholly beneficial and have universal support.

I am not a politician. I have been a Republican, not ever since I was born, but ever since that party was born. I am a Republican now, but I am opposed to oppression and slavery in Colorado, the same as in South Carolina. I have a warm fellow feeling for the pioneers, one of whom I was for the greater part of my life, and I will stand for them as long as I stand at all. Especially do I stand for the pioneer living in or near a forest reserve, where the winters are long and the summers short, making his life a hard one at the best, and will continue, to the best of my ability, to help him to get a "square deal."

A GROWING COUNTRY.

Progress in the San Joaquin Valley of California can not be better illustrated than by directing attention to Stanislaus county. The development here can hardly be appreciated by those who do not make a personal visit and spend a few days upon the scene. It has been only five years since the Turlock and Modesto irrigating canals were opened, and the country has expanded in population and improvements almost beyond contemplation. What was formerly vast grain fields, farmed with little permanent population and with very indifferent success, especially in later years, has given way to beautiful green alfalfa fields, fruit orchards and variegated gardens, with comfortable country homes for a multitude of people. The next five years will wholly transform the country from a semi-wild state to a condition of a modern civilized, happy, prosperous and contented rural community, supplied with good schools, mail delivery and electric railroads.

The unique campaign of promotion and development that has been undertaken by all classes of California's citizens with marked vigor and publicity at all times, but more especially during the last half decade, has caused a large influx of homeseekers from all parts of the country who desire small farms. The publicity undertaken on behalf of the state has borne excellent results, for the reason that preparations have been made so that settlers may purchase lands suited to their requirements. Country lands in California have, consequently, risen enormously in value.

In the old days the great interior valleys of California, the San Joaquin Valley and the Sacramento Valley, of empire extent, were almost entirely owned by large land owners, who cultivated, in vast tracts, enormous crops of grain. These huge grants, some of which ranked among the largest tracts under single ownership in the United States, were held intact. It was impossible for the small farmer to purchase lands. This condition obtained throughout California.

The owners, who in the main had obtained their lands from Spanish grants, were not disposed to sell. Their decision was impelled by two causes: first, that it did not pay them to sell a small corner from their estates, as the land could be more profitably farmed in wholesale operations; and, secondly, that the natural rainfall, while amply sufficient to care for grain, was not so distributed as to encourage diversified and continuous farming throughout the year.

Today the amazing development of irrigation projects renders the cultivation of small tracts most feasible, thousands of settlers are pouring into the state, the vast reaches of the San Joaquin and Sacramento Valleys are dotted with hundreds of new homesteads. Little farms are springing up everywhere.

The big land holders are subdividing, millions of dollars are being added to California's annual production. The movement is striking not only throughout the Sacramento and San Joaquin Valleys, but throughout the State of California as a whole.

One example in Stanislaus county will give some idea of the rate at which the country is growing. Five years ago a tract of less than seventeen hundred acres of land known as the Wood Ranch, situated four or five miles west of Modesto and in Modesto Irrigation District, had but one house upon it and this was not occupied save during the grain harvesting season. The land was subdivided and with some adjoining land sold in small tracts to settlers. Within a year a school district was created for the benefit of these settlers and two years ago it was fond necessary to build an addition to the school house and to employ a second teacher. Four-year-old improved places in this tract, now known as the Woodland Colony, have a market value of $250 and higher per acre. There are a score or more of like colonies in the district in various stages of advancement. They are uniformly prosperous, the land yielding abundant crops and prices uniformly high.

As early as last autumn fourteen new school districts had been created and twenty-three teachers added. Seven rural delivery routes have been installed, and free mail delivery has been instituted in Modesto. The school system of the county ranks sixth of the fifty-eight county school systems of California. Fourteen teachers are employed in the grammar grades of the Modesto schools and five in the high school. Graduates of this latter institution are admitted to the State University and to Sanford University on their diplomas.

Stanislaus county is acknowledged to rank among the first of the state in its public high and grammar grade schools. It has four high schools, one being at Turlock, in the Turlock Irrigation District, one at Modesto, in the Modesto Irrigation District, one at Oakdale and one at Newman, and grammar schools at convenient places throughout the county. In the Turlock and Modesto Districts there are twenty-three grammar schools properly and conveniently located. Our high schools are accredited to the State University.

The people of Stanislaus county are enterprising, intelligent and progressive. The new conditions which have awakened the new era in the annals of the old province have attracted a class of settlers who may be said to have every requisite for active citizenship. Stanislaus county is now a modern county with a modern set of people in charge of its affairs, and the natural sequence will be rapid modern progress.

GARDEN CITY KANSAS and VICINITY

BY R. H. FAXON.

THE IRRIGATION AGE has requested the above named to write something each month for this publication concerning Garden City, Kansas, conditions there and in western Kansas generally, something touching the work of reclamation and development there, and what is being done to make western Kansas attractive to people throughout the country, especially in the Middle West and in the West.

Properly to write on this subject one must have a knowledge of it, and must impart that knowledge to the reader. Hence a few introductory words concerning Garden City, first of all, and later of western Kansas, to those readers not already familiar with these places, may be pertinent.

Garden City is the most important point in southwestern Kansas. It is a city of nearly 4,000 inhabitants, located on the main line of the Atchison, Topeka & Santa Fe railroad, sixty-five miles east of the Colorado line. It is the capital of a rich kingdom, which a political writer in Kansas years ago termed the "shortgrass country." Conditions make this section homogenous and sui generis. There is no other section in the country quite like it, with respect to topography, physical conditions, natural resources and spirit and psychology. Having gone through an experience calculated to try out men and find the stuff of which they were made, during the days when irrigation and applied agricultural science were, respectively, a lost and an undeveloped art, the people of this section have been bound together and have been welded into a compact body that is peculiarly its own. Infected by the bigness of the country, their minds are broad and their thoughts are liberal. They are manly and womanly to the highest degree. They are successful, for the tried ones who went through the "boom" period know what it meant to play with edged tools and have not since been lost to either caution or cunning. They are hospitable, kindly, prosperous and contented.

Garden City holds a place essentially its own. Located 200 miles west of Hutchinson, Kas., the commercial center of middle Kansas, and 200 miles east of Pueblo, Colo., the dominating commercial center of south-central Colorado, Garden City is not approached in any way by any other town or city. As all roads led to Rome in the olden days, so did all the cow trails, years ago, lead to Garden City; and now all the automobile and wagon roads head in there, wherever there is not a railroad to bring the people to this common center of southwestern Kansas. To that great country southwest of Garden City, comprising five Kansas counties without railroads, Garden City is the metropolis, the commercial center, the hub, the capital.

Irrigation was born, so far as this section of the country is concerned, in the Arkansas valley, and Garden City was its cradle. Many years ago, the ditches and canals ran out like spider's legs from this town. In Garden City lived a band of men who preached and believed in irrigation from the start. They practiced what they preached, and the wonderful fertility of western Kansas soil, unsurpassed plus the water, soon made the town even in those days the acknowledged mistress of the great southwestern Kansas. Proudly and uninterruptedly and seldom disputed, it has held sway ever since.

Garden City has, then, nearly 4,000 inhabitants; is the hub of southwestern Kansas; and was a prime factor in irrigation in its infancy. Its name does not belie it. It has physical beauty in addition to commercial importance. It is a veritable garden—for, in the beginning, these wise pioneers did what few western communities did; they planted trees. And then, fearing they had not planted enough, they planted more. There were the cottonwood, that father of all Kansas trees, the poplar, the ash, the locust, and many other varieties, but principally those named. The big, broad main street of Garden City is flanked with great shading branches that make a pleasing sight to the traveler on the Santa Fe Limited, who rests his eye in hot summertime on the grateful foliage of these green giants that throw their protection and comfort

over this western town in a manner seldom seen in the smaller communities.

The residence streets are so dense with shade that there has ever been a thinning process, at times, something almost unheard of in a western community. The lawns and the flower beds supplement the work of the trees, and the "Garden" City is no misnomer.

Garden City is a modern town in every respect. Its commercial importance and the character of the country surrounding it, with the fact that it is on the main line of a great railroad system have made it necessary for the town to keep pace with modern requirements and not to become provincial in any sense. For instance, it had electric light and telephones before any city in western Kansas. It has had for years the largest hotel in the state, west of Wichita and Emporia. It has an opera house that is a credit to the town. It has sidewalk and street-cleaning ordinances that put it in the city class. It has ice plants, storage establishments, water works, and that sort of thing. Its supremacy is due to the initiative and force of its people, and the fact that it is no mere straggling small town.

What is called the "Garden City spirit" is a factor well known in the development of the west. The incentive to progress is greater here, proportionally, than in almost any other town or city of the west. The citizenship is of the highest possible character, and energy and public spirit abound. Thirty thousand dollars was raised in no time to get the big sugar factory. The Industrial Club of Garden City is one of the best known bodies of a commercial nature in the west. Only a few days ago the town, which has a vote of nearly 1,000 voted aid to the Kansas-Colorado electrical railroad and transmission project, which will be treated later at length in this page, in the way of bonds, with but thirteen votes in the negative. Less than a week ago—as this is being written—the town entertained several hundred guests when ground was broken for this project, gave a formal breakfast to 100 prominent visitors, had band and orchestra, a smoker and supper in the evening, and paid for all the entertainment of these people during their two-days' stay in the town. These few things are mentioned to show the resourcefulness and energy with which the town proceeds in any public matter, or anything that may serve to bring it before the public.

Another instance of this very thing was seen at Albuquerque during the recent Irrigation Congress. The Garden City delegation, calling itself the "Boosters," went the several hundred miles in a special Pullman car, with banners flying, with large badges reading "Garden City Boosters," took a prominent part in the congress, and conducted for Pueblo the campaign that was made for that large city's desire to be the meeting place for next year. That Pueblo lost was by no means the fault of Garden City.

Garden City has a number of good things of which any city of greater size might well be proud. It has a beet sugar factory, independent, costing more than a million dollars. It is the seat of the government reclamation plant, costing $350,000. It is the seat of the Garden City national forest, which contains more than 200,000 acres. It has a joint government-state dry-farming experimental station. It will have, next spring, the quarter-million-dollar pumping plant, now building, of the United States Sugar & Land Company, which owns and operates the sugar factory. It has been chosen as the site of the first of the three big powerhouses of the Kansas-Colorado Electrical Railroad & Transmission Company, for which ground has been broken.

Briefly, and in a word introductory, the writer has essayed to give some idea of the town of Garden City and establish in the reader's mind its location and importance. In future will appear more general stories of various great industries and public works, and more concerning the development of the country tributary.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

GOODING, IDAHO.

An Eleven-Months-Old Child of the Desert Showing What Human Energy, Aided by Irrigation, May Produce.

EDWARD F. BARBER.

Nowhere has the struggle of the human race been more severe in its conquest of nature in her wildest and most formidable forms than in the desert regions of the earth. Nowhere does nature respond more generously to the demands of the conqueror than in these same regions. As the reward for the effort is correspondingly high so the incentive to action is correspondingly increased.

The great Snake river valley of Idaho has since its first discovery by the white man presented desert nature in her most unattractive form, by reason of its vastness and the extremely arid conditions existing. Yet through this great desert flows one of the mightiest rivers of the continent. The Snake river has its source in the high mountains of the region of the Yellowstone park amidst the eternal snows of the Bitter Root and the Teton ranges of the Rocky Mountains. It enters the southern rectangle of Idaho at its northeast corner, flows in a crescent shape sweep to the south and west, leaving the desert portion of the state at the northwestern corner of the rectangle which constitutes southern Idaho.

This valley is about the size and shape of the state of Kansas and the Snake river, with its tributaries, makes it by far the best watered section of the whole of arid America. The millions of money necessary to the subjugation of this great desert region has been made available through the U. S. Reclamation laws and the Carey Act, which donated to the state of Idaho 3,000,000 acres of desert land to be irrigated by the state.

The great irrigation projects operated under this most beneficent law lie in the middle Snake river valley. If you will look at a map of Idaho you will find the Oregon Short Line railway threading the desert from Pocatello to the western boundary of the state and along about the middle of the route you will see the name of Gooding. At the time the map was made, Gooding was a passing switch and a water station for transcontinental trains. But irrigation, under the Carey act, has changed all this during the past eleven months. Full 80,000 acres of these lands lie in the immediate vicinity of Gooding and the magic touch of water has wrought the wonders of the ancient magician during the past eleven months. A young city of 800 people has sprung up. And these people have under construction at present $200,000 worth of substantial fire proof buildings. Among these is a fine white brick hotel, a $25,000 white brick school house, a beautiful cement block church of the Presbyterian denomination, a printing office of cement blocks, two stories high, with a 50-foot front, in which is being installed a plant costing $10,000, a cement block building three stories high with a 150-foot frontage, in which will be a modern opera house capable of seating 1,500 people, two banks are in active operation, a splendid furniture store, a hardware store and a number of general merchandise establishments. Gooding has a commercial club of forty active members who are out after business for Gooding. There are three large lumber yards in the town, all doing an immense business. Brick for the buildings have been burned on the townsite and at a short distance from the town are found fine beds of sand and gravel suitable for all sorts of concrete work. Contracts have been let for three blocks of cement walks now under construction and an ordinance has been passed authorizing three more blocks to be put in at once.

Aside from being on the Oregon Short Line main line, it is the junction of an electric line with the Short Line. The electric line is now graded twenty-five miles to Jerome and there are on the tracks at Gooding rails and ties sufficient for five miles of new track.

City waterworks are under construction. The pumps are now supplying the town from the city standpipe, but the pipes have not yet been placed. This will be done within the next month and Gooding will justly boast of another step accomplished towards becoming such a city as her magnificent surroundings will justify.

DROPS FROM THE IRRIGATION CONGRESS.

[BY OLANDER.]

In commemoration of those joyful days and nights from September 29 to October 3—those "Five Nights" when the 1,051 delegates, who established a record for good-fellowship and good-nature equalled only by the same qualities inspiring every citizen of Albuquerque so long as it played the role of hostess to the Irrigation Congress, were serious and gay by turns, in the convention hall and in the red upholstered room of the Alvarado Hotel—the following anecdotes are written down:

ARNOT'S BAR BILL.

He wore a badge that identified him as a member of the local reception committee, and to those strangers who troubled to inquire his name was found to be Arnot, Scotchman, and his occupation bossing the biggest trading outfit in the southwest—the Gross-Kelly Company, which sells blankets and curios to tourists and everything from pins to prairie schooners to the inhabitants of the country for 300 miles around. He felt the weight of the responsibility which rested on his shoulders, a responsibility which included among other things the proving to all the visiting delegates the indisputable fact that Albuquerque knows well how to cheer the stranger within her gates.

It was not yet noon and the hospitable room at the end of the long wing of the Alvarado was a trifle less crowded than usual. Arnot, radiant in the possession of two wandering delegates, whom he had coralled in the less cheerful, if more righteous lobby, led the way to a vacant space at the polished mahogany counter behind which stood the polished-mahogany-hued Mitchell, he of the never lacking smile, and with a rich Highland brogue asked cheeringly for his guests to name their hearts' desire.

The liquid sunshine dispensed and swallowed, Arnot now addressed himself to Mitchell, the ubiquitous bartender.

"How much am I owing this morning, Mitch?"

The delegates exchanged significant glances. Surely it is not the usual thing for gentlemen, even in Albuquerque during an Irrigation Congress, to become indebted to a bartender before the sun has reached the zenith.

"Yo' all ain't stuck much today, Mistah Arnot," came from the grinning purveyor of the bottled care-annihilators as he fingered three slips of paper on the cash register. "Only forty-five cents this mornin', Mistah Arnot."

Then in reply to the unspoken queries of his companions, the big Scotchman explained, jokingly:

"Ye see, it would be verra embarrassing if a gentleman forgot to pay for his liquor and Mitch here were forced to call him back. And in these busy days anyone is quite likely to walk off unmindful of his bill. So I arranged with Mitch to settle for any drinks that might be left unpaid for. It's little enough to do. And it's cost less than I believed it would."

Western hospitality has come to be a sadly overworked expression these days. But if Bret Harte's time developed more perfect hosts than Alququerque furnished, then that happy historian failed to recount their virtues. And the truth is, anyone of a score of Albuquerque's citizens did as much as Arnot for the comfort of the Irrigationists—and in as quiet and practical a way.

WHEN HEARST SIDESTEPPED.

William Randolph Hearst, whatever else he is or with whatever contumely he may be attacked, is not and has never been accused of being a physical coward. For all that, the Hon. William is well guarded whenever he ventures across the East or North rivers and leaves the confines of his mansion on Manhattan Isle. And, be it said in passing, the Pinkertons are enriched thereby. One never knows, in these days of unscented, Standard Oil-Senatorial love-note disclosures, what may happen to the man who is thus ruthlessly spreading out before a gaping public's gaze, the confidences of friends. Besides, the Pinkertons need and Randolph has—the money.

It remained for the convention hall in Albuquerque and a crowd of 4,000 mildly interested Irrigation Congress delegates and their friends to be respectively the scene and the audience to witness the worst scare the Independence party's proprietor has had in all his trans-

Roosevelt Dam, Salt River, Arizona.

continental speech-making trip. And the fact that the scare was really unnecessary and quickly turned into a joke in nowise detracted from its seriousness while it lasted.

Hearst and his presidential candidate, "Honest Tom" Hisgen, had been seated on the platform while the big throng applauded politely. The newspaper proprietor had finished a speech in which politics was not once referred to and was about to resume his chair when—the scare came.

The newspaper men in front of the platform instinctively ducked as the whistle of some object moving rapidly through the air warned them of a missile hurled in their direction. An instant later the thing [it was moving so fast it could not be distinguished] flew across the platform on a level with Mr. Hearst's midsection, said midsection being directly in the path of the winged object. Mr. Hearst sidestepped with wonderful speed and with a momentary flush of unmistakable fear warming his bloodless countenance. Two stalwart men in black clothes, seated unobstrusively at one side of the platform, sprang to their feet simultaneously.

The thing hit the big wall map at the rear of the platform with a dull thud; dropped to the floor and then rolled meekly back towards the Hon. William, now wholly himself again, save for a forced grin that illy hid the shock he had so recently received.

It was an apple—a big, pale, yellow, irrigated apple—the gift of some unknown in the body of the hall who doubtless wished to make sure of its reaching its destination and used more strength in sending it on its kindly way than was necessary.

The resourceful political dabbler, bringing into service all those famed powers of turning seeming rout into positive triumph, bent his six feet plus to the apple and, taking it in his hands, bowed generally to the big audience as he took his seat and proceeded to break it in two for grateful mastication.

But William was destined to be disappointed. The apple was too big and firm and his hands too weak. The best he could do was to smear his fingers with its juice!

THE PETTICOAT BOSS.

The El Paso delegation was distinctively in its effervescent, joviality; its absolute lack of an axe to grind; its privately-owned brass band and sleeping cars, and its ability and inclination to create a shortage in the visible supply of Albuquerque's good thing. The El Paso delegation came for fun. The Pueblo crowd was as distinctive with their big white badges; their page advertisements reciting in wondrous language the beauties of their town, and their soul-stirring ambition to become the seat of next year's congress. Pueblo came for business.

It remained for California to present as diversified a purposeful delegation as ever (dis)graced a convention. There were Symmes and Loveland, the magnetic San Franciscans whose minds were filled not half so much with irrigation as how best to induce the greatest number of delegates to return with them to the City of the Golden Gate and lend eclat [whatever that is] to the sessions of the Trans-Mississippi Commercial Congress. There was Jastro, he who heads that mighty body known as the American National Livestock Association. He left Bakersfield and his huge interests to advise the farmers that the stockmen here agreed to quit censuring Gifford Pinchot. Jastro came to make peace. There were "Al" Hechtman and "Jim" Bishop, who acted all the time as if they thought the congress was a Bohemian Club, "Jinks" and the red upholstered room in the Alvarado the only worth-while center of interest to good irrigationists in all Albuquerque. Al and Jim came to enjoy themselves and spur the El Paso outfit to greater exertions. There were Beard of Sacramento and Mendenhall of Los Angeles—very serious gentlemen [who drank not, neither did they smoke] who came to do things. There was a real astronomer writing for the Hearst papers and wearing a California delegate's badge. There were the Inyo county trio, headed by the uncompromising, fighting editor, Chalfant —with a grievance against the Reclamation Service that will worry many a government official before they're done, if appearances count for anything.

Verily California brought a varied crowd.

But the worst has not been told.

California produced the woman who thought she could boss her delegation. It would be unkind to mention her name. Suffice it to say she came from San Francisco determined to run the doing of her state in the congress, no matter who would say her nay.

The first morning of the first day, the congress learned from the secretary, as he read the several notices, that "the California delegation will meet in the Resolutions Committee room immediately following the morning session. By order of Mrs. —— ——."

There's no telling what might not have happened following this bold announcement by the lady, who shall remain unnamed—had an El Paso delegate not grinned sarcastically. That grin settled it. California would show those Texans she was no region of serfdom to females with strong minds.

Accordingly the California delegation did not meet in the Resolutions Committee room that day—and when it came time to elect the honorary vice-president of the delegation, Mrs. ——— saw [to her intense disgust and vexation, not to say anger] Mrs. John Fairweather, who had played the part of pleased spectator rather than self-seeking politician, fairly hurled into the office.

California, or, more properly, that small portion of it represented at Albuquerque, thus registered itself against woman's suffrage.

Gate of the Hondo Reservoir, Inlet Canal, New Mexico.

"THE JUDGE" AND THE BAD BILL.

Coin collectors, attention! Judge J. F. Hechtman, of Globe, Ariz., who met his cousin, "Al," of San Francisco, for the first time in thirty-five years over the spacious, round-topped table in that red-upholstered room of the Alvarado, is the proud possessor of a twenty-dollar bank note which theoretically is valueless and practically is without doubt almost as rare a specimen of national currency as the "Judge's" big Gila monster badge, the one and only banner of its kind at the congress.

The Judge had been trying in vain to foot one of the dozen bills for as many rounds of drinks which had been served to the happy little throng surrounding the table. "Cousin Albert" had each time forestalled his relative's attempt by reaching the grinning bar boy, Frank, a few seconds more quickly. But at last the Judge's opportunity came and he slid the twenty-dollar bill across the table and insisted that he be permitted to buy at least once.

One of the crowd picked up the bill casually to inspect it. Paper money is at best unusual in this southwest country. It was issued by a national bank of Winchester, Ky., and was obviously government-printed. But, wonder of wonders, it was lacking the signatures of the cashier and president!

When the Judge's attention was called to the omission he silently received the startling news. Then, without comment, he laboriously and without so much as by your leave untied his shoe; removed it, and depositing the queer bank note in the sole, calmly laced up the boot again.

"I'll frame it when I get back to Globe," he said, finally. "And I've put it where I shant spend it—so long as I remain in good society."

And the fact that the Judge still possessed the curiosity as he boarded the train for his Arizona town, spoke volumes for his continence in Albuquerque.

WHEN DEWEY WAS HURT.

Jastro, serious, shrewd land and cattle owner and boss of the biggest stockmen's organization in the country, did not join frequently in the happy gatherings in the Alvarado. The Jastro constitution was in bad health during the congress and innocuous spring waters were the only drinks allowed. For all that, brother Jastro was not wholly miserable as witness the following:

It was one of the infrequent visits of Jastro to the charmed circle in the red-upholstered room. Everybody had told a yarn and now it was the stockman's turn. And this was his offering:

"I was on a business trip to Washington several years ago and dropped in Paul Morton's office one afternoon. Truxton Beale was present and so was Admiral Dewey.

Flathead Valley Grain.

It seems Beale had just been urging the Admiral to pay a visit to his ranch in the San Joaquin Valley. The Admiral was questioning Beale minutely about the place. Finally he asked, perfectly seriously:

"'And how is the boating? Is it good on the San Joaquin?'

"Beale kept his face straight by an effort, but couldn't find his voice to make answer. So I chipped in with:

"'The boating is all right. Admiral, if you strike it right. You can get a fine sail off a good lively bronco anywhere in the San Joaquin.'

"That was too much for Paul Morton. He tilted back in his chair and laughed so hard be fell all the way over onto the floor. Beale grinned, too. The Admiral gave me one look that spoke more than a book could hold, and ran out of the room as mad as a wet hen. They told me afterwards Dewey is slightly deaf and hence the more sensitive when anybody laughs when he is not in on the joke.

"So, for all I know, he may still be wondering about what kind of boating there is on the San Joaquin."

Send $2.50 for The Irrigation Age
1 year, and The Primer of Irrigation

SISKIYOU COUNTY, CALIFORNIA.

T. J. NOLTON
SECRETARY SISKIYOU COUNTY CHAMBER OF COMMERCE.

The most northly county in the great state of California is known as Sis-ki-you; the word is of Indian origin—sis means girl and kiyou pretty—the country is full of them.

This wonderfully favored section of the west has everything that any other California county has excepting sea coast.

One hundred and twenty-five miles of the state of Oregon marks its boundary. The trains of the Southern Pacific railroad, which crosses the county from north to south, pass over eighty miles of track. In eastern Siskiyou this same railroad has opened up Butte Creek valley, by building 75 miles of road reaching from Weed to the great lakes of northeastern Siskiyou. Independent of the roads owned by the Southern Pacific Company there are four other railroads in the county, counting none of the logging roads. Within the broad boundaries of the inland empire of Siskiyou every industry of the great west is carried on.

Copper mining, gold mining in its different branches, logging, milling, manufacturing, cattle raising, dairying, ranching or farming and fruit raising. There are five rivers in the county, and more than one hundred creeks. The available water power, and that which has already been developed, is the greatest on the Pacific coast. The Siskiyou Electric power and Light Company had to dig but 4,700 feet (580 less than one mile) to get a vertical drop of 720 feet. The wide distribution of electricity by this company has made it possible for a number of ranchers to pump water to irrigate with at a cost only nominal.

While there are 300 irrigating ditches in the county, the electric pumping system will enable an unlimited number of ranchers to get an abundance of water onto their property, at a very small cost.

There is no such thing as a failure of crops in Siskiyou county on irrigated ranches, and there are a great many ranches on which fine crops are raised where the annual rain fall of 15 to 25 inches affords the only moisture.

Of the 6,200 square miles (4,000,000 acres) of the county's area—40 square miles less than the combined area of the states of Connecticut and Rhode Island—one-half is timber land, a large percentage being white pine. Several large sawmills and many small ones are cutting lumber at the rate of 200,000,000 feet annually. Several factories are cutting the low grade lumber (estimated at 60 per cent of the mills' output) into boxes supplying one-half of the number used in the state.

Since the discovery of gold in the county at Scott River in 1851, fully $150,000,000 of the precious metal has been mined and the gold output of the county now amounts to $1,000,000 a year.

We have undeveloped coal and iron deposits, lime, onyx, jade, marble and other building stones.

Within the last few years rich and extensive copper mines have been developed and this industry promises to become one of the most important.

Sixty thousand head of cattle are shipped annually from our railroad stations, the value of $1,000,000 are Siskiyou cattle, balance are from the ranges of eastern Oregon.

There are 1,000 ranches in the county, many of them very large. No scientific farming has been carried on. On many of the ranches nothing but hay is raised, and that often is wild grass. The cattle feed on the ranges from May until October and the hay fed to them during the winter. Some seasons the winters are so open that the cattle are kept on the ranges.

Every crop raised in the temperate zone thrives in this county. Wheat, barley and oats to the extent of 500,000 bushels are raised. Nearly all of our wheat is sold for seed in the big Sacramento valley, south of us. The growing of grains has not been carried on as extensively as the crops warrant, for the reason that our farmers find it easier to grow hay and feed it to their cattle.

The dairying industry is an important one and brings to the farmers half a million dollars a year. Time will come when the present output will be trebled or quadrupled, as conditions here are ideal for making butter—an abundance of wild and cultivated grasses, and a never-failing supply of the purest water on earth.

So famous is the cream of Scott Valley that a firm of ice cream makers in Portland, Ore., haul in wagons a distance of 25 miles every other day 40 to 50 twelve-gallon cans of cream, and ship it by express from Yreka, the county seat, to Portland, a distance of 350 miles. The cream is first put through a process to prevent it turning sour. While no attempt has been made at growing fruit for the market, the horticultural possibilities of the county are great—apples, pears, peaches, cherries, English walnuts and small fruits grow to their greatest perfection.

Orchards of bearing fruit trees across the border in southern Oregon and in many other parts of the coast are netting the owners $500 to $1,000 dollars an acre. There is no place in the wide, wide world, unless on the South Sea Islands, where the cocoanuts drop at the feet of the natives, where the people live with less exertion than do they in the part of California of which I write.

The climate here is delightful, the mercury dropping to zero only in occasional winters, excepting in the high altitudes.

Frequently during the whole of a winter's month the freezing point is not reached. In the summer there is a hot spell in July or August, but the nights are always cool.

So delightful are the Siskiyou summers that the residents of the lowlands south of us spend the heated term in our mountains along the line of the railroad, breathing our life-giving air and drinking the effervescing water of our mineral springs, some of which rival those of the old world. Here city-worn humanity may rest and recuperate amid the grandest of mountain scenery.

Our streams teem with trout and salmon in their season.

Home of S. H. Soule, Little Shasta Valley, Siskiyou County, Cal.

Shasta river is the home of the largest rainbow trout in the world, and the McCloud river is equally famous for its "Dolly Vardens."

Many of the religious denominations are represented, and our one hundred schools are among the best in the state. Both of our high schools are accredited in all studies to the State University. Our tax rate is the lowest, only $1.45 on the one hundred dollars. The amount of taxable property amounts to $17,000,000, being an increase of $5,000,000 in two years.

Our population is twenty to twenty-five thousand and should be one hundred thousand or more.

Homes may be secured from the owners of the big ranches who are subdividing and selling in small tracts. Bargains may often be secured from the anti-rustlers, who want to go at something easier than farming. There are still opportunities of homesteading public lands, living on them continuously for 14 months, then paying the government $2.50 an acre.

Men with a few hundred dollars with which to get a start, if willing to work, can always find employment at the mines, mills and ranches, while their families remain on their newly acquired ranches and raise most everything needed to sustain them.

Supreme Court Decisions

Irrigation Cases

CHANGE OF USE BY APPROPRIATOR.—

An appropriator of water from a stream for irrigation of land on one side of it cannot, as against subsequent appropriators, use his appropriation for irrigating land on the other side of the stream.—*Williams* v. *Altnow.* Supreme Court of Oregon. 97 Pacific 539.

RIGHTS OF SUBSEQUENT APPROPRIATORS.—

Every riparian proprietor on a non-navigable stream is entitled to a reasonable use of the water of the stream flowing through his land, and after the natural wants of all the other riparian proprietors have been supplied he may use their corresponding rights.—*Williams* v. *Altnow.* Supreme Court of Oregon. 95 Pacific 200.

RESTRAINING ENFORCEMENT OF RATES BY SUPERVISORS.—

A court of equity has jurisdiction of a suit by an irrigation company to enjoin the boards of supervisors of the respective counties through which its canal extends from enforcing rates fixed by them under the California statute, which it is alleged do not enable the company to earn in the aggregate the income to which it is entitled under the statute, and to determine in a single suit the legality of such rates, on the ground of avoiding a multiplicity of suits.—*San Joaquin & Kings River Canal & Irrigation Co.* v. *Stanislaus County.* Circuit Court, Northern District of California. 163 Federal 567.

PRESCRIPTIVE RIGHTS.—

Owners of land acquired by prescription title to an irrigation ditch through the land of a third person, with a right to conduct through it a designated quantity of water. The third person subsequently executed leases of the right to carry water through the ditch, which leases were signed by persons purporting to represent the owners of the land irrigated from the ditch, but who were not connected with the owners. The leases were for a nominal rent. Other leases were executed to and signed by persons purporting to act as water commissioners for a district for a mere nominal rent, and other leases were executed to a corporation organized for the irrigation of lands. The owners were in possession of the property at the time of the execution of all the leases. *Held,* that their prescriptive rights were not extinguished under Civ. Code, Sec. 811, providing that a servitude is extinguished by disuse for the period prescribed for acquiring title by enjoyment, etc.—*Strong* v. *Baldwin.* Supreme Court of California. 97 Pacific 178.

REGULATION OF IRRIGATION RATES BY COUNTIES.—

Under Act Cal. March 12, 1885 (St. 1885, p. 95, c. 115), which provides that the boards of supervisors of the several counties of the state shall estimate as near as may be the value of the canals, ditches, flumes, water ways, and all other property actually used and useful in the appropriation and furnishing of water for sale in the county by any irrigation company, etc., and in like manner to estimate the annual reasonable expenses of such company, including the cost of repairs, and to establish maximum rates of charge for water by such company such that its net annual receipts and profits shall not be less than 6 nor more than 18 per cent upon the said value of the property, when in making such estimate a deduction is made for deterioration of the plant from year to year, an allowance should be made for such deduction and added to the annual income in fixing the rates of charge to cover the cost to the company of renewal or reconstruction.—*San Joaquin & Kings River Canal & Irrigation Co.* v. *Stanislaus County.* Circuit Court, Northern District of California. 163 Federal 567.

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BLUEWATER VALLEY
NEW MEXICO

BY OLANDER.

Inquiries received from our article of last month on the Bluewater Valley in Valencia County, New Mexico, prompted us to make a more detailed investigation of the results obtained from this year's cultivation by the Bluewater Development Company. We found that about 2,000 acres had been in cultivation at various times, that alfalfa produced about a ton and a half per cutting and that it sells at an average of sixteen dollars per ton on board cars Bluewater, that oats produce from sixty to seventy-five bushels per acre, and are selling at about one dollar per bushel, as we said last month; that potatoes grown in the valley equal the famous Greeley potato and produce from 30,000 to 40,000 pounds to the acre; sugar beets planted in July when pulled in September weighed four pounds and a half, and beets from the valley have tested as high as 21 per cent in saccharine matter; onions produce bountifully; cabbages and cauliflower reach a size not attained elsewhere, and, in fact, apparently all kinds of garden truck and field crops are raised successfully and produce net results that are difficult to believe.

Some of the reports of experts on the soils found in the valley may be of interest to our readers.

President Tight, of the University of New Mexico, has said of these lands:

"The agricultural lands of the company lie wholly in one of these basin-like filled sections. The soils, therefore, are very deep, and as they are composed of elements from the decay of sandstones, volcanic rocks and limestones, they are very fertile and light. They have the property of retaining their moisture so that not so much moisture is required for irrigation or as many other types of soil."

Another interesting comment is by George G. Anderson, consulting engineer and a well known member of all the more prominent engineering societies of the United States and Canada.

Mr. Anderson has written:

"The soil throughout almost the entire irrigable area is a red clay, of uniformly good quality and great depth. The color is due to the presence of oxide of iron, a valuable constituent for crop producing, and while the soil is of decomposed sandstone, it is not sandy in character. Both soil and sub-soil are extremely fertile.

"The soil is of a character that does not require much water for the propagation of crops, it is not lumpy, nor does it show signs of 'baking.' The soil conditions will result in a high duty of water, higher, in my judgment, than I have placed it elsewhere in this report, with the prospect of an extension of the irrigable area with a given quantity of water.

"The irrigable land presents, generally, a uniform surface, with gentle and regular slopes, well adapted for irrigation purposes.

"A wide range of products can be successfully raised, including all the cereals, alfalfa and other grasses, sugar beets, vegetables of all descriptions and the hardier fruits."

Mr. A. J. McCune, former state engineer of irrigation for Colorado, made an examination of the Bluewater project some time ago and says of its soil:

"The very fine quality of soil, the healthful climate, the abundance of building material and fuel and its cheapness, the abundance of free range for stock contiguous to the farming land on every side, will enable men with small means to make homes and build up valuable properties at a very small cost.

"It seems to me to be an excellent place to make a community of small stock growers and stock feeders. My observation for several years has been that stock growing under conditions as they appear to exist there is the safest business for men of small means. Being on a through line of railroad, the facilities for shipping any of their products are good.

"The limited area of irrigable lands in that and contiguous territory will always give the farmer in that neighborhood a good market in the mining camps, government posts and lumbering camps adjoining."

James J. Armstrong, irrigation expert of Denver, has thrown an interesting light upon the lands by comparing them with the fertile lands of northern Colorado. He says:

"There was about twenty thousand acres of very fine land in sight which lays first rate for irrigation, quite as good as the best of our lands in northern Colorado.

"After looking over the ground there can be no question as to the fertility of the soil. The whole valley is covered with a rank growth of weeds excepting where it is covered with a heavy growth of wild hay or alfalfa. It is plain that with a good water service heavy crops of all kinds can be raised in this valley.

"To sum up the whole situation, I would say that there is an opportunity here for quite a large settlement with comfortable homes and profitable farming operations, as the markets are close at hand."

Richard J. Hinton, a prominent member of the American Society of Irrigation Engineers, writing of the soil in Bluewater Valley, says:

"As to the fertility and adaptability of the soils and lands, under the Bluewater system, I have no hesitancy in expressing an entire approval. As it lays out of doors, I have seldom seen 25,000 acres so perfectly adapted to irrigation as these. About one-half the acres—the western section—consists of the famous red loam so eagerly sought after in our region. It is charged with mineral elements, deep, warm, easily worked and retentive of moisture. This is largely the product of volcanic rocks. There is a distinct division between it and the lower, or gray limestone made lands.

"The latter are excellent vegetable, grape, small fruit and forage lands. Both soil divisions are tractable, deep and readily watered and drained. The surface loam or deposits are from 15 to 30 feet in depth. Beneath the tufa or volcanic soil there is at about forty feet a volcanic hard pan.

"The limestone soils are underlaid with gravel and hard strata. Drainage waters for well use can be obtained in the volcanic or red soils at from thirty to forty feet. The subplane waters are about the same

depth in the lime rock soils (admirably adapted for alfalfa). In short, these soils will produce abundantly all the crops of the temperate zone. This will be found to be an excellent sugar beet section. All root crops as well as grain, forage and leguminous products will thrive abundantly. The natural grasses are of the best. The range and foot hills furnish wild fruits, gooseberries, raspberries, Rocky Mountain cherries, plums, etc., in abundance. High altitude timber is ample for years to come, scrub oak, cedar, mesquite, pinion or scrub pine. Coal has been found within six miles. Mineral float has been found. Pine timber is near by. Fine limestone rock furnishes the kiln men, and there are works in operation producing about 90 or 95 per cent pure lime. I noticed excellent building stone also."

. The writer has a theory that an investment in irrigated lands has all of the safeguards offered by the purchase of life insurance with many added advantages. The life insurance agent, after his seven or eight unsuccessful attempts to get to his prospect, begins by enlarging upon one's duty to those one may have dependent upon him and after having firmly established this duty proceeds to persuade him that the one and only way to fulfill this duty is either to pay such an amount as he can or perhaps cannot afford, as long as he lives to his, the agent's company, or as an alternative to pay a greater amount for say twenty years and at that time receives a paid-up policy or an annuity, or maybe a proportion of what has been paid to the company in cash.

One buying a tract of irrigated land may obtain all of the security offered by the insurance company and, more than that, the use of the land with twenty or thirty per cent increase as soon as the land begins to produce.

If he is a laboring man and by any mischance loses his job, he has a place where he can provide a home and a living for his family amid surroundings such as those who have gained a competence spend a great deal of money in seeking for—an avenue in which to spend their leisure time.

If he is a salaried man he can, instead of just making ends meet, amid uncomfortable surroundings, with a small percentage of the time necessary to earn a living as an employe of some one else, establish himself as his own master over his own home, which will produce as much if not more than he has heretofore been earning and leave him at the end of the year with money in the bank and an assurance that he can obtain the same and usually greater results in succeeding years. While, if he simply wishes to invest his money, he has purchased something which no changes in financial conditions, no weakness of trusted employes, no mistakes in the judgment of others, can take away from him and which will produce an income that no other investment offering even a portion of the security could approach.

Of course, it is not the idea of this article to attempt to supplant insurance investments by any others, but in many instances the added advantages offered by land that will produce a crop every year as surely as each year rolls around, should be carefully considered before any other investment is made.

(Any inquiries regarding any of the irrigation enterprises mentioned in these columns will receive prompt attention if sent to Editor IRRIGATION AGE, Chicago.)

IDAHO AN EMPIRE OF DIVERSIFIED WEALTH AND OPPORTUNITIES.

BY A .T. TAYLOR.

Out-West-in-Idaho, that's where they are doing things! There is more activity, more prosperity and greater development in Idaho today than in any other state in the Union. The thousands of acres of rolling prairie lands that but a few years ago were the playground of the coyote and the sagehen are now being rapidly converted to agriculture. Railroads are stretching out their lines in every direction, new towns are springing up like magic, and all these changes are taking place so rapidly that only instantaneous photography can mark the transformation.

Men talk of enterprises in Idaho involving millions as though money were a mere incident to the object to be attained. Everything is large and liberal there, and all things attendant upon success and prosperity seem to have been born of a common parent.

Nature in the distribution of her wealth has been prodigal to Idaho. Her mountains contain many rich and dividend-paying mines, and yet the great development in this direction is to come. These same mountains which surround her valleys form a great water-shed which in the near future will irrigate millions of acres of fertile farms and will furnish power second only to that of the Niagara.

Read this from Governor F. R. Gooding's statement at the conference of governors at Washington, May 14, 1908, and take off your hat to Idaho:

"Idaho leads all the Western States as to the amount of irrigated lands and land open to settlement. The total acreage now under irrigation is 1,656,593, while more than $20,000,000 has been spent in constructing 9,000 miles of canals and ditches. Idaho has a wonderfully rich soil. It is formed by the disintegration of the Columbia River lava, or basalt rock, which, mixed with the lava dust that fell in great showers over the whole country ages ago, has formed a soil of marvelous fertility. Idaho appreciates the needs of settlers and capital. Idaho offers to the bona fide settler a clear title to his lands and water; to the investor a careful administration of all the rights of capital provided for by the Congress of the United States in the Carey Act; and to both, by closest inspection of projects as to plans and personnel, a fair deal with square people."

The conditions for farming are so ideal that to dispose of land, once there is water upon it, is but a secondary consideration, yet there are thousands of acres of land in Idaho at the present time practically worthless for agricultural purposes, which within the next two years will be under thorough irrigation systems and will be worth $35.00 per acre and upward. The man who is lucky enough to get in on the ground floor and acquire forty or eighty acres of this land may consider himself fortunate indeed.

In Lincoln County alone there are over 600,000 acres of agricultural land, all of which will soon be under irrigation systems. The rapidly growing and prosperous town of Shoshone, on the Oregon Short Line, is the county seat of Lincoln County and centrally located within this vast area of irrigable lands, making it the most convenient point from which to visit all the Carey Act projects as well as the improved ranches in the county.

A few miles east of Shoshone are 50,000 acres of splendid agricultural land which is the property of the Idaho Irrigation Company. In June, 1909, this entire tract will be put upon the market under the Carey Act. This, with 50,000 acres of irrigated land of the Twin Falls North Side Irrigation Company, are all tributary to Shoshone, which loudly emphasizes the future prominence of the town and places it conspicuously in line as one of the coming cities of Idaho.

The citizens of Shoshone are a live and progressive people, proud of their town and willing with their dollars to back their unbounded faith in its future, which is apparent in its substantial stone and brick business blocks, its imposing court house, its fine schools and churches, and its handsome residences. It has good hotels, lodging houses and restaurants, and affords splendid accommodations for visitors.

Although Shoshone is growing in rapid strides, the demand for residence property is far in excess of the supply, and from five to six families are turned away weekly for lack of accommodations. There is an unequaled opportunity for some one with the means to build a number of cottages for rent and sale. Investments along all lines are exceptionally promising, and conservative business men of the community predict that Shoshone will double its population within the next two years.

Governor Gooding and his brothers, to whom a large measure of the advancement of Lincoln County is due, and who are known throughout the length and breadth of the State as men of large enterprise and sterling qualities, are numbered among Shoshone's foremost business men. They are Shoshone's exclusive bankers at the present time and are the proprietors of an extensive general merchandise store. Their bank has a wide and lucrative patronage, and is known as one of the most substantial institutions of its kind in the State. Shoshone is to have another bank, however, in the near future, which proclaims an important step in its growth and solidity.

An electric railway is now in course of construction from the town of Milner, on the Twin Falls branch of the Oregon Short Line, through the town of Jerome and on to the towns of Shoshone and Gooding. As this road will ultimately be extended to Boise, it will place Shoshone on two lines of railroad, a position of no small commercial consequence. From a competitive view, Shoshone certainly has a point of vantage to be seriously reckoned with by the towns of Southeastern Idaho.

Shoshone has an association, composed of her best citizens, known as Shoshone Commercial Club. It is the purpose and pleasure of this club to furnish information and literature to those who desire it upon all matters pertaining to the town or surrounding country.

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THE MANUFACTURE OF CONCRETE DRAIN TILE.

A Coming Industry.

One shining example of remarkable success in the line of manufactured commodities of concrete is the flourishing drain tile business that has been developed principally in the last two or three years in those sections of the West where the surplus oil waters must be removed before anything approaching maximum crop production can be attained. Already the field of operation is widening in this line to the delta lands of the South, which, when reclaimed, will make one of the most fertile regions of the world. The climatic conditions make possible almost priceless crops of fruits and vegetables, and they lie close enough to market to make immediate results tangible the first year after the improvement of drainage is provided for. In California, far beyond the reach of present transportation facilities for clay drain tile to reach, they are awakening to the opportunity presented by the adoption of concrete drain tile as the only means to successfully reclaim countless square miles of what is now little better than waste land to the agriculturist.

The drain tile business, starting in the Middle West to meet the needs of the farmers already engaged in the cultivation of valuable land, is merely in its infancy, for the work that lies before the concrete drain tile industry from now on into the future amounts to the stupendous undertaking of reclaiming an area of farming land equal to that part already under cultivation. Not this generation or even the next will see any appreciable diminution of the field for operations. Whole sections as yet unknown to the agriculturist will be made to blossom and bring forth fruit abundantly, and the day is at hand when waste lands will yield fortunes to tile manufacturers with the capital to improve cheap real estate by simply putting in the tile to give sufficient drainage.

Speculative capital is looking in this direction at the present time, because it is close to Mother Earth and too simple a route to big profits to go unseen. It is clearly better, saner and safer than any mining project that has been successfully exploited in recent years, and better still, it is a proposition that will appeal to the farmers, who are rapidly becoming the holders of the surplus or speculative wealth of the land. At the same time it is a proposition which can be capitalized, controlled and operated by the farmers themselves and an intimate knowledge of every step of the proceedings, thereby assuring intelligent and profitable administration. In this way the concrete tile offers a suggestion for the farmer by using the practical knowledge obtained in his own farming business to keep his investments in his own hands.

This is a pointer to the legitimate promoter—the man who knows how to make the tile right—to get busy in the direction of big things in the concrete tile indusrty, even though it may mean large activity a long ways from home. The drain tile manufacturers as a rule have all the business they can take on for this season without any extraordinary effort on their part, and nearly every man is working his think tank to figure out a longer day, or, failing in that, an increase of capacity by additional machinery.

A correspondent visited some of the busy Western shops where drain tile manufacture is a specialty, and he gives the following expert observations:

"About the first of May I happened to notice the extensive plant of a tile manufacturer in an Iowa town. They had just set up and started into operation the second tile machine to increase the capacity of their plant. It was installed by the Cement Tile Machinery Company of Waterloo, Iowa. The first machine was installed about eighteen months ago, and has been running continuously since first put into operation, and the proprietor stated that he had not a tile in stock that was old enough to send out, as it is his practice never to deliver any tile that are less than thirty days old.

"For the purpose of introducing concrete drain tile in the local market he took a county contract which required

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large quantities of tile, ranging in size from 6 to 24 inches in diameter. All the tile larger than 12 inches in diameter were made in hand molds, but the smaller sizes were all machine made. This county contract was started two years ago this coming fall, and quantities of the tile were delivered then upon practically the full length of the line, but the work was delayed for the purpose of completing the main ditch into which the line discharges. The tile delivered during the latter part of 1906 and the early part of 1907 lay unprotected from the weather along the line until they were put into the trench, some of which had been done comparatively recently. In fact, I saw nearly a mile of tile stretched out through the swamp above ground, most of which was delivered in October and November, 1906. Some of these tile were entirely submerged, while others were partially under water, and still others were entirely high and dry. The tile had evidently been frozen repeatedly in the position in which I saw them, but when examined they were found to be in perfect condition. The number of broken tile along that line was remarkably small. I noticed some 15-inch tile two feet in length which were about two years old being placed in the trench which at that point was about 10 feet deep. The treatment received by this concrete tile which had lain exposed for two winters, and subjected to the natural freezing and thawing of that period certainly proves their superiority to drain tile made of clay in this particular. No clay tile other than a perfectly vitrified one could resist disintegration under such conditions. In fact, it is well known to those who are interested in land drainage that ordinary drain tile of clay are badly disintegrated by the action of frost, and the outlets of drains using them are constantly changing, due to the breaking down of the exposed tile.

"My interests growing in the matter, I learned of several farmers in the immediate neighborhood who had made use of quantities of the product of this plant in draining their lands and I examined some of the concrete tile drains which have been in almost two years. I observed the outlet on a farm drain system and found the 8-inch tile at this point in first-class condition. The first fifty or sixty feet of this line was covered with only earth enough to protect it against stock, and therefore exposed to the extremes of freezing and thawing for two winters. After finding the tile in that outlet in perfect condition I went to the head of the ditch and exposed the tile which were at this point covered by about four feet of earth. The tile here was also found to be in perfect condition. I examined the tile on a 4-inch lateral line and here found this size also in first-class condition, and the farmer, who is quite an enthusiast over the perfection of his drainage system, remarked that these were harder than when they were put in, as they were taken from the plant when only two weeks old. He stated that there was very little loss in the handling of concrete tile in the operation of laying it in the ditch and hauling it to his farm, and further that his drains were giving perfect satisfaction.

"I will say that this statement was verified by the splendid flow witnessed at the outlet of the system. Together we crossed over to an adjoining farm and visited the outlets of several clay tile drains. My farmer friend and companion advised that these drains had been in over a year longer than his; that is to say they had passed three winters. I believe I am safe in saying that there was not as much water being discharged from five separate lines as from the one just cited, although the total area drained was very much larger. The outlets of three of these clay tile lines were constructed of hard glazed tile, while the other two, of soft clay, showed a very marked tendency to be disintegrated for about 10 feet, the broken down tile having been shoveled out, and an open drain was being used from the present end of the tile to the lake into which it emptied.

"At another town I took occasion to inquire as to the developments and progress of the drain tile branch of their operations, and one of the proprietors informed me that they had never been able to keep up with their orders at that place for concrete drain tile and blocks. They have been in business for a number of years and have a splendidly equipped factory, steam heated in winter and electric lighted. The plant is run the year around, and the proprietor is a great believer in the future of cement products, in which they have built up a very satisfactory and profitable business.

"There is no question in my mind after these observa-

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Also Manufacturers Single Cylinder, Double Cylinder and Four Cylinder Gasoline or Kerosene Engines

Briefly stated the advantages of our Double Cylinder Engines are as follows:

First—They are more economical in the use of fuel. On light loads one cylinder can be used, reserving both cylinders for heavy loads.

Second—Although weighing about one-half the weight of a single cylinder engine of same rated capacity, vibrations are practically overcome, demonstrating conclusively that in proportion to strain the double cylinder "Master Workman" is the stronger engine.

Third—The heavier weight of a single cylinder engine is due to the fact that it must have heavier fly-wheels in the horizontal type, and a longer, higher and consequently much heavier base than is required for the "Master Workman." The heavier the fly-wheels the greater the strain on the crankshaft, so you will realize that neither heavier fly-wheels or a heavier base contribute one iota to the strength of a single cylinder engine.

Fourth—When vibrations are overcome, as in the "Master Workman," the lighter the engine and the less cumbersome it is, the greater its sphere of usefulness and the cheaper and more convenient it can be handled.

Fifth—Lubrication in our engine is absolutely perfect. There is no forced lubrication, lubrication being by gravity. Certainty of lubrication is of vital importance in the steady running and operation of a gasoline engine.

Sixth—All mechanism is in full view, which will enable you to thoroughly understand the operation of a gasoline engine. The worst kind of complexity is concealed mechanism.

THE TEMPLE PUMP CO. Factory, 15th St. and 15th Place, near Canal St. Chicago, Ill., U. S. A.

When writing to advertisers please mention The Irrigation Age.

tions, which were conducted as carefully as could be, but that concrete tile drains the soil more thoroughly and rapidly than do clay tile. I long ago observed that most clay tile, though they are certainly affected by frost, are not sufficient porous to permit the passage of water freely. Drainage therefore is entirely through the joints. Concrete tile of the same length have equal drainage through the joints, plus the drainage through the shell.

"The last manufacturer of tile mentioned above told me of one farmer who placed two lateral lines in the same field, draining about the same area, one using clay tile and the other concrete tile. This farmer reported that he was able to raise a crop last year from his concrete tile, while the crop over the clay tile was destroyed owing to the failure of the latter to carry the water off before the young crop was killed. Such testimony, I take it, is the best practical endorsement that could be secured for this thriving branch of concrete industry."

Those who desire information, literature, etc., regarding machines for the manufacture of concrete drain tile should write the Cement Tile Machinery Company of Waterloo, Iowa.

"Small potatoes and few in a hill" is an old saying that need not apply to your garden any more if you are willing to adopt progressive methods and provide for means of supplying your truck patch with water during the dry periods that prove so destructive to plant life every summer.

Yes, every summer there is a period of a longer or shorter time that your potatoes are blighted, tomatoes withered, cucumbers shriveled or other garden truck burned out.

How can you prevent it?

Easily, if your water supply in the ground is abundant at a depth not greater than 40 feet, or if you have a stream that you can pump from.

The same result can just as surely be accomplished where the water is found at greater depth, but of course greater power will be required.

If you are interested write now to Dempster Mill Mfg. Co., Beatrice, Neb., who are making a specialty of small irrigating plants. Tell them just what your problem is and they will help you solve it. Their advice will cost you nothing but your time and stamp for your letter.

The award of contract to Mr. Tom Burke, of Belle Fourche, S. D., for the construction of five miles of laterals under the Belle Fourche irrigation project, has been withdrawn and the contract reawarded to Mr. L. W. Dotson, of Orman, S. D.

This contract was awarded to Mr. Burke on June 25, but before it was prepared for execution he had departed for parts unknown. The work involves the excavation of about 45,000 cubic yards of materials and Mr. Burke's bid was $2,637.30. Mr. Dotson's proposal was $2,655.

Send $2.50 for The Irrigation

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The Primer of Irrigation

Mayer

Irrigators', Engineers', Prospectors' and Miners' High Cut Boots

Expressly adapted for irrigation work. Made of the highest quality and stock. Strong, comfortable and dependable. Many styles. Protect the feet and keep them dry. Can be secured through shoe dealers. If not obtainable, write to us.

For a dress shoe, wear "HONORBILT"

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For Pumping, Cream Separators, Churns, Wash Machines, etc. FREE TRIAL. Ask for catalog—all sizes

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gives best service, lasts longest, causes no trouble. Don't buy a fence until you have written about this, our

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CHAS. A. GREEN, Editor.

An Opportunity—A Prize Contest

Earn a New $500.00 Piano
Earn a $50 Marlin Rifle
Earn a $12 Internat'l Dictionary
Earn 100 Peach Trees
Earn 100 Plum Trees

NOTE—We offer these and other prizes besides our regular cash commission.

Send us no money. Simply send us your name and address and we will send you our confidential terms to canvassers, stating how you may obtain valuable prizes FREE for a little work introducing Green's Fruit Grower in your neighborhood.

USE THIS COUPON

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Gentlemen—send me Green's Free Agent's Outfit, consisting of 3 different issues of Green's Fruit Grower and your confidential terms to canvassers stating how I may obtain hundreds of dollars in prizes and cash pay for a little work introducing Green's Fruit Grower in my own neighborhood.

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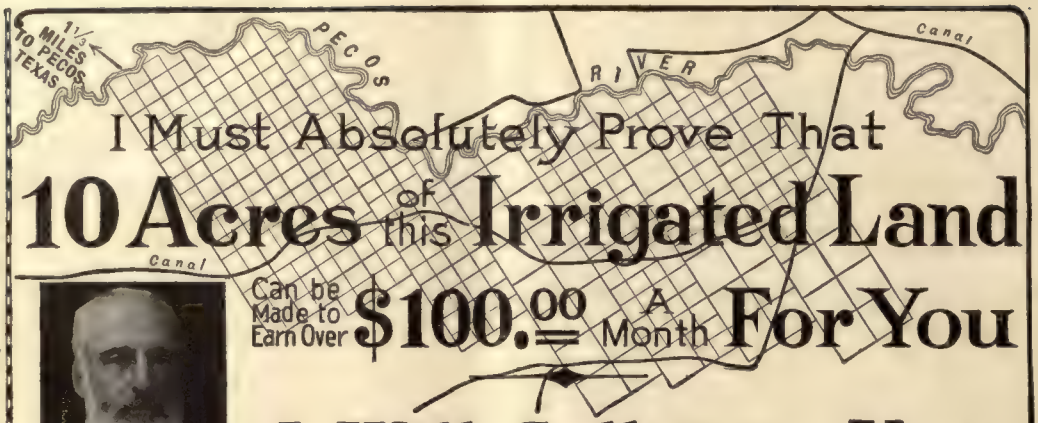


I Must Absolutely Prove That

10 Acres of this Irrigated Land

Can be Made to Earn Over $100.00 A Month For You

TEXAS & PACIFIC RAILWAY

Geo. E. Barstow
President
Pecos Valley Land & Irrigation Co.
OF

BARSTOW TEXAS

I Will Sell it to You for $3.00 a Week

Any one who is familiar with the results from Texas Irrigated Land will tell you that the safest, surest way to gain a large and permanent income from a small outlay is to get hold of a few acres of Texas Irrigated Land.

But, heretofore, it has required some capital—at least a few hundred dollars—and it has been necessary for the purchaser to go and live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest kind of Texas Irrigated Land, all under cultivation, income property from the very beginning, if you can save $3.00 a week.

You can go and live on it—absolutely assured of an independent living from it alone.

Or arrangements will be made to have it cultivated for you for a small share of the crops.

Now I can and will prove all this from the highest authorities in the land.

All you have to do is—write to me and say, "Prove to me that ten acres of your Texas Irrigated Land can be made to produce an income of from $1,000.00 to $5,000.00 a year."

I have the proof, so read what my company will do for you.

New Safe Land Plan

I will deliver at once to the Citizen's State Bank of Barstow, Texas, a Warranty Deed to ten acres of the land of the Pecos Valley Land and Irrigation Company as per the subdivision of the Company's property made by John Wilson and filed for record with the County Clerk of Ward County, Texas.

I will deliver at once to you, one of our Secured Land Contracts for the Warranty Deed at the Bank—on the contract appears a certificate signed by an Officer of the Bank and certifying that the Bank has your deed and will deliver it to you according to the terms of your Secured Land Contract. The Bank acts as an independent agent for both of us—to guarantee fair play.

You must pay $3.00 a week, or at the rate of $3.00 a week in monthly, quarterly, semi-annual or annual payments.

Or you can pay as much faster as you like.

At the end of each year—if you take more than a year to complete your payments—you will be credited with 5 per cent per annum on the amount you have paid.

$15 down and $3 a week paid regularly, and the interest credits, will mature your Contract in a little over two and three-fourths years.

But you can mature your Contract by paying the same total amount, $483, in a day, a month, six months, a year, or in any less time than 2¾ years, and whenever your regular receipts and your interest allowance credit receipts total $483, all you have to do to get your land is to take or send your receipts and your contract to the Citizen's State Bank at Barstow, Texas, together with twenty-eight vendor lien notes each for $39, payable one every three months for seven years.

The Bank will then give you your Warranty Deed to the land, which, according to the Contract and the Deed, must be fully irrigated and all under cultivation.

Remember this is ten acres of land which I must first prove is capable of producing an income of from $1,000 to $5,000 a year.

You get this land for $483, which you can pay in less than three years—$15 down and $3 a week—and you then have only four $39 notes each year for seven years to pay out of your income.

Can you hope in any other way, so safe and sure as this, to have so large an independent income in so short a time?

I believe the purchase of Texas Irrigated Land to be the best way for a man of small means to make himself independent. And I believe I am qualified to pass judgment as I have been interested in irrigation matters locally and nationally for 15 years.

The results are simply astounding to those who are unfamiliar with the great subject of irrigation.

And I believe the happiest man these days is the man with the little ten acre irrigated farm—(President Roosevelt says, "Even 5 acres is enough to support a family and keep it busy").

The owner of a Ten Acre Irrigated Farm doesn't have to "knuckle to the boss," nor strain his conscience in the struggle of the intense commercialism of the day.

His income is practically untouched by "financial depression."

His living and peace of mind are not dependent upon the whim of any man.

He is king in his own little domain.

He can make his little ten acres earn as much as a quarter section (160 acres) unirrigated, would produce—as much as between twenty and eighty thousand dollars in cash would bring, loaned out at 6 per cent.

He has his close neighbors, his telephone, good roads, schools and churches—in fact, all the comforts and conveniences of life that come with the prosperous close-knit community, though they pass by the great isolated farm.

The land I want you to buy is all good rich soil, irrigated from Canals and Ditches already constructed in the most approved modern fashion and carrying an abundant supply of water taken from the ever-flowing Pecos River.

It is within a few miles of Barstow, Texas, and Pecos City, Texas, (the two towns are only 6½ miles apart—the land lies between the towns and a little to the north) and served by the Texas & Pacific Railway and the Pecos Valley Line of the Santa Fe System.

With rich soil, a splendid climate and the uncertain quantity—moisture—eliminated, agriculture and horticulture can here be scientifically carried on to the splendid profit of the land owner.

The abundant crops of large and in every other way superior hays, grains, cotton, vegetables and fruits are equaled in only a very few favored spots.

The justly celebrated Barstow Grapes are considered by many to be even better—variety for variety—than those raised in Southern California—and we are 1,200 miles nearer the great Eastern market. But all this is the merest outline of what I desire to show you in detail. I am only attempting to make it clear to you that you can have an assured independent living income in less than three years if you can possibly save $3 a week.

Safeguarded

The Bank will deliver your deed direct to you when your $3.00 a week and interest credits total $483.00

It Doesn't Take Long

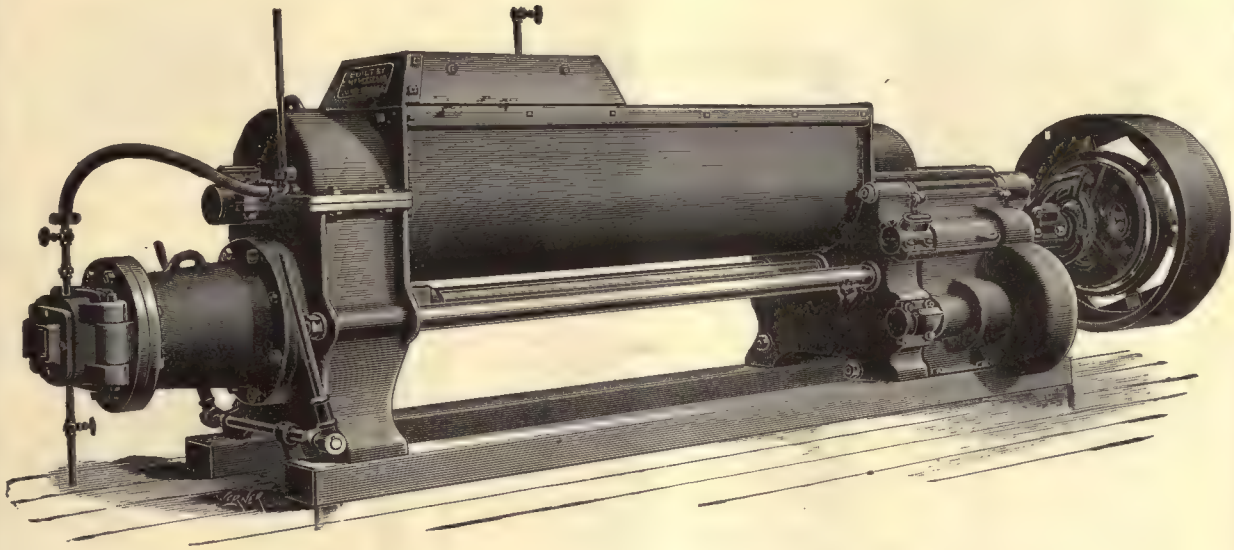
I have promised to submit the proof. All you have to do is write for it. Will you do that today, even if you can't commence right away? I want the address of every man or woman who is willing to save $3 a week if I can prove that the result will be financial independence in less than three short years.

There is nothing philanthropic about this proposition, but I especially want to hear from the wage-earners. I have worked for fifteen years to develop this Irrigation System and this community. It would be gratifying to me to have those who most need it reap the benefits of my labors.

It will be more convenient for you to address me at St. Louis, and I am equipped there to best answer you.

GEORGE E. BARSTOW, President
Pecos Valley Land and Irrigation Company, of Barstow, Texas, 849 Missouri Trust Bldg., St. Louis, Mo.

UNION MACHINES
WITH PUG MILLS COMBINED



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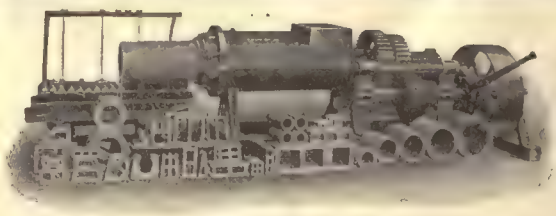
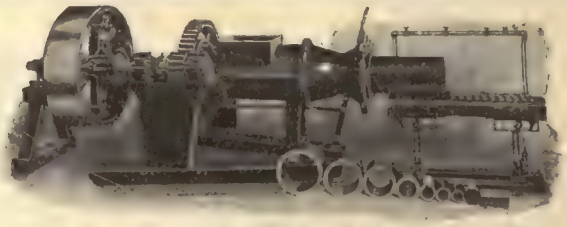


Centennial Auger Machine



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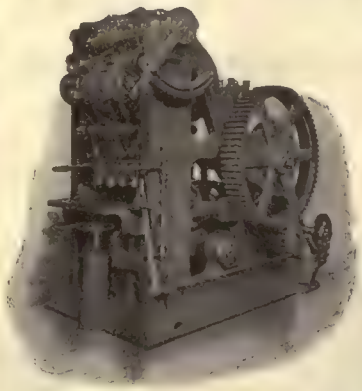

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We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

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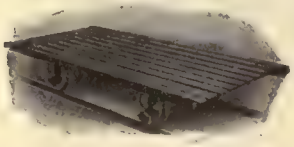

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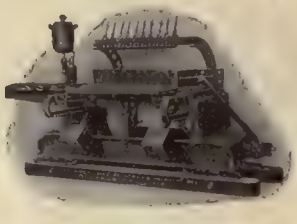

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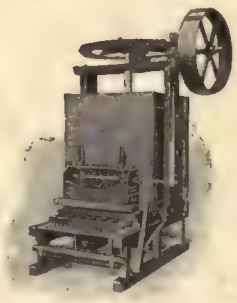

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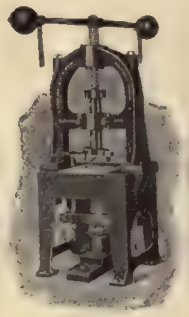
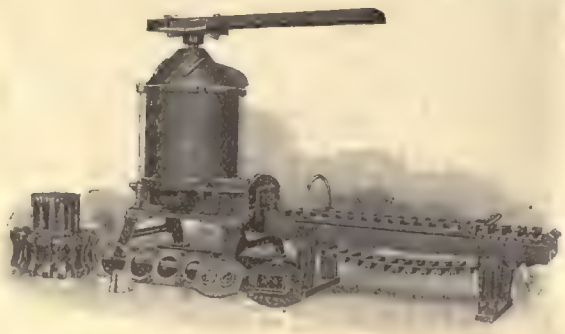


Hand Power Screw Press



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Products of our Auger Machines

Vulcan Steam Shovels

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10 Standard Sizes

The Vulcan Steam Shovel Company
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$1,000 Reward

for its equal. Wind power doubled. Two 14 ft. wheels work on same pinion; second wheel gives more power than first.

A Governor That Governs

in all winds. Develops 10 full h. p. in 20 mile wind. All power needed for farm, shop, irrigating, ... about our self-filling, ... single wheel pumper—also Automatic Husker. A... book 6...

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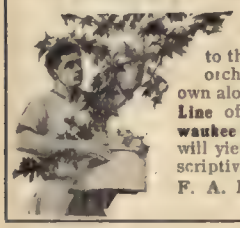

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Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

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The engine that will please you.

Any style engine 3 to 60 horse power.

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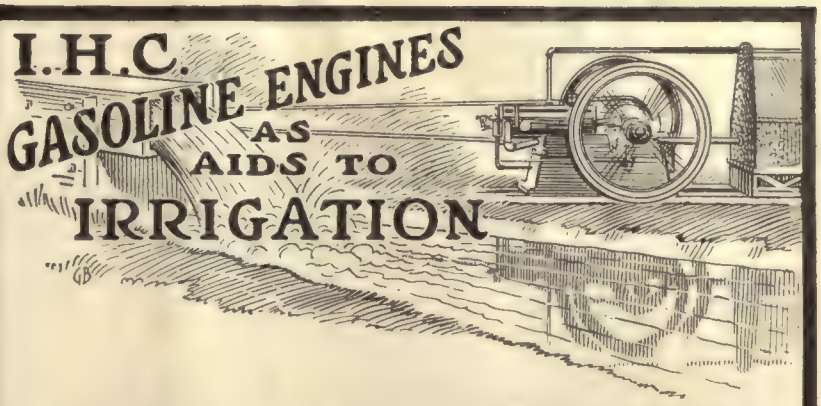
I.H.C. GASOLINE ENGINES AS AIDS TO IRRIGATION



Almost every farmer has a few acres of land that lie too high to be irrigated from his laterals. To flume or siphon the water to these few acres is not practicable on account of the expense. And yet to let this land lie idle means a big hole in the profits of the farm each season.

The most economical and satisfactory way to bring such waste lands under cultivation is to use the powerful I. H. C. gasoline engine to pump water upon them.

These engines pump water in large quantities.

They are operated at small expense.

They require but little attention.

The cost of running an I. H. C. engine during an irrigating season, including fuel and attendance, is a very small item compared with the value of the crop that will be produced.

Remember, the engine will be operated only a short time during the season. During the remainder of the year the engine is available for other farm work, such as running the cream separator or churn, sawing, grinding, cutting feed, etc.

And even while the engine is being run to irrigate the lands, the operator does not give it his whole time. He returns to it occasionally. He can devote practically all his time to looking after the head of water which the engine pumps.

The cost of the engine is only a fraction of the value of the reclaimed land. Its cost of operation for the season is only a fraction of the value of that season's crops.

When you buy an I. H. C. engine you have a power for pumping that is good for many years' service.

If you have land lying above the ditch, why will not an I. H. C engine for pumping water be a wise investment for you?

Call and see the International local agent about it. He will supply you with catalogs and give you all information desired. Or, if you prefer, write direct to the nearest branch house.

WESTERN BRANCH HOUSES: Denver, Colo.; Portland, Ore.; Salt Lake City, Utah; Helena, Montana; Spokane, Wash.; San Francisco, Cal.

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Economical, Reliable Running Water Service

A constant supply wherever you want it. Automatic in action—no expense for power or repairs. It's easy with a

RIFE HYDRAULIC RAM

Large and small rams for Country Places, Irrigation, Supply Tanks, Town Plants, etc. For every foot water drops to ram it is raised 30 feet. 7,000 in use.

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until you get my "Leader Fence Book" and learn how to secure the cheapest and best all-wire field and yard fence made. Pay no royalty to trusts or factory combinations. I challenge any and all fence makers to equal the "Leader Fence" in strength, durability and price.

I make the **Leader Fence** in the **most economically run fence factory** in this country, of the very best galvanized steel wire, and sell it **direct to you** at world-beating prices. Or, I will sell you the wire and all materials at wholesale prices and furnish you the **Perfection Fence Machine**, with which you can build the fence right on the posts at home. **I am the All-Round Leader Fence Man.** Write today for my FREE fence book.

H. L. FAHRNEY, MANAGER,
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THE PNEUMATIC PIPE DREDGE

The Pneumatic Pipe Dredge is a new, inexpensive device for dredging sand, silt, muck and gravel, or any other material or soil susceptible to rapid disintegration by the action of water under pressure

From one to four or even more pipes can be operated from the same scow; one pump and air compressor serving for all.

Its pipe or head "jets" itself deeply into the material to be handled, breaks it up and forces it upwards through a discharge pipe by the use of water and compressed air mixed under high pressure. It is not a suction or centrifugal dredge. It is a hydro-pneumatic ram.

The Bed Rock Pneumatic or Compressed Air-Pipe Dredge.
This shows the pipe lifting the heavy black sand out of one of nature's bed rock riffles. The precious minerals like gold and platinum have been trapped in these pockets or riffles for untold ages, but no method to recover these stored up treasures had been devised before the advent of the pipe dredge. This dredge will enter these pockets and recover the values they contain.

ATTENTION ENGINEERS.

It is not possible to describe this dredge nor tell of its superiority in a few words. However, IF YOU HAVE USE FOR A DREDGER, it will pay you and save you money to look into the merits of this device. It will also save time. Here is part of what Mr. M. A. Nurse, for 18 years Chief Engineer of the State of California, says about the Pneumatic Pipe Dredge.

"Beyond question, the Pneumatic Dredge embraces the cheapest and best application and utilization of mechanical and natural agencies for excavation and transmission of sand, silt, or any material susceptible of rapid disintegration by the joint action of air and water under pressure, that I have ever known through an active experience of over thirty years in river improvement and reclamation. It is simple in principle, cheap in construction, efficient in operation and must on the score of economy and greater adaptability supersede other methods in the broadest field of river and harbor improvement essential to our State and National development."

HAVE YOU DREDGING TO DO?

If you require a dredge for reclamation work, for levee building, for recovering sand or gravel, for filling, for channel or harbor deepening, for mining or for lifting or moving any class of material excepting boulders, DON'T OVERLOOK THE PNEUMATIC PIPE DREDGE.

Pneumatic Pipe Dredge, Operating by Electricity, with Four Ten-Inch Discharge Pipes. Capacity over 15,000 Cubic Yards per day.

CHEAPEST AND BEST DREDGER IN THE WORLD.

The Pneumatic Pipe Dredge can be installed anywhere within a few weeks for a small fraction of the cost of other dredges and it requires only one-fifth the labor, one-fifth the power and one-twentieth the cost of maintenance of any other dredge with similar capacity. It handles from 40% to 60% solid matter all the time and dredges handling from 25 cubic yards per hour to 20,000 cubic yards per day can be built and installed for from $3,000 to $25,000. There is nothing to get out of order. Anyone with common sense can run it. It is "fool-proof." Don't you think

IT IS WORTH WHILE INVESTIGATING.

One of these dredges is operating in the heart of the City of Sacramento, California, on a contract for the city. Twice in succession this dredge has been awarded city contracts on competitive bids. Other contractors could not come within a mile of the price bid for the work. Yet the dredge is making money. It is practical results like this that talk.

For full particulars about the dredge and its installation on a royalty basis, address

HERBERT A. PARKYN, 1511 Marquette Building, CHICAGO, ILL.

PUT IN A RELIABLE

WATER-TIGHT AND DURABLE

IRON HEADGATE

NOW WHILE YOU HAVE TIME AND BEFORE THE GROUND FREEZES

You know how much trouble you had this year with your old wooden headgate leaking and perhaps washing out, and next year you would have still more trouble with it. You know that no matter how well a wooden headgate is made, or how much you spend for repairs, it is not as strong and durable as an iron headgate. A wooden gate is certain to swell, warp and decay, causing leaks and probably a washout just when you most need the water. Can you afford to risk losing valuable water next year, or waste valuable time this year making repairs on that old wooden gate?

A wooden gate is a yearly expense because of the leaks, washouts, loss of time, and the repairs. A Northwestern Iron Headgate is a lifetime investment which will pay you big returns. When you get a headgate, the first cost is not the only thing to consider. The cheapest gate is the one that lasts the longest. As one Northwestern Iron Headgate will outlast a dozen wooden gates, a Northwestern is really the cheapest and most economical. The cost of repairs year after year on an old wooden gate amounts to more than the cost of a substantial iron headgate.

Northwestern Iron Headgates

Being complete in themselves, can be easily set up by any one. As they can be easily and quickly operated, they will save you time and trouble. By careful machine work they are made absolutely water-tight. And being made of iron and a little heavier than absolutely necessary, they will last a lifetime without getting out of order and without repairs.

Send For Northwestern Headgate Handbook

It contains valuable information for irrigating farmers, shows many kinds of iron headgates and irrigation specialties, and gives some practical details. Fill out this coupon and mail it today if you are interested in the most economical methods of handling water.

C. D. BUTCHART, Denver, Colo.

My Absolute Guarantee

I will send a Northwestern Iron Headgate on thirty days' trial, freight prepaid, to any responsible farmer. If the gate does not prove to have all the advantages claimed, ship it back at my expense, and I will pay you what it costs you to set up the gate.

C. D. BUTCHART, Denver, Colo.

Mail This Coupon

C. D. BUTCHART, Denver, Colo.

Please send me the Northwestern Headgate Handbook, and prices on iron headgates.

Name .....

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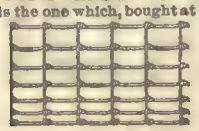
THE MONEY-SAVING FENCE

is the one which, bought at the right price, gives you the best service, lasts the longest, causes you no trouble.



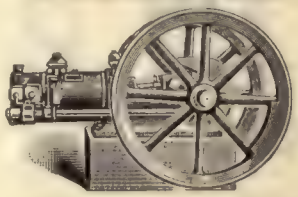
NATIONAL FIELD AND HOG FENCE

is just that kind. Made of heavy, single wire, an incomparable lock close mesh, as strong as a stone wall. Don't buy a fence until you have written us about this and our Ranger Barb Wire—a heavy, single wire with rotary barb. Tell us what you require and we will name you delivered price.

DeKALB FENCE CO. DeKalb, Ill. Kansas City, Mo.

Otto Suction Gas Producers
And Otto Engines

Are Reliable and Can Be Operated By Men of Ordinary Intelligence

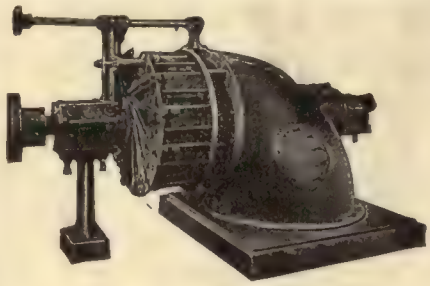


J. A. Witter, Engineer for the Beaver Crossing Electric Light & Power Co.. Beaver Crossing, Nebr., writes:

"Please send me a book of instructions on handling and running your gas producer and engine. I have been running this one on horse sense, but that might not work at all times. Plant works fine.

This man without special instructions, but with the use of "horse sense" causes his plant to work fine. There is a volume of praise for "OTTO" machinery in Mr. Witter's short letter.

The Otto Gas Engine Works
Philadelphia, Pa.



SAMSON TURBINE

When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the HIGH SPEED of the SAMSON, for a given power, lighter and consequently CHEAPER transmission machinery can be used.

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Write Department K-2 for Catalog.

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DENVER, COLORADO

At the OXFORD HOTEL, Denver, Colorado, you will find all the leading men interested in irrigation and all of its branches.
Denver is the logical irrigation center of the United States. You will find nearly everyone engaged in or interested in irrigation projects stopping at the Oxford Located half a block from the Union Depot: Fire Proof, Modern, European Plan and Popular Prices

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It Makes You Save a Coin a Day or the Clock Stops

PAT. NO. 775058

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Savings Bank Clock

This is a novel combination of an alarm clock and savings bank, provided with a coin chute, also automatic locking and unlocking mechanism. The clock in its normal condition is locked, and cannot be wound until a coin is deposited into the slot. Within a brief period after it is wound, the clock is automatically locked again and cannot be wound until another coin is deposited. It takes nickels, dimes and pennies, and holds over eighty dollars in dimes.

Start Now saving your dimes, nickels and pennies and have ready money for your vacation, Christmas presents, clothing, life insurance, etc.

Banks—This bank clock is now being used successfully by hundreds of banks as a savings account stimulator and business getter—its compulsory savings feature and general usefulness make it much more valuable than the ordinary metal bank.

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That's the way Eckerle Pianos find homes for themselves.

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will be sent free and postpaid to you if you ask for it. Then in the quiet of your own home you can, by means of these beautiful photographs and complete descriptions, read and learn just how **well** Eckerle Pianos are made, why they stay in tune so long; why they last a lifetime; why they always satisfy, and why it is called the "Piano with a Soul." This book takes you on a trip through one of the largest and best equipped piano factories in America, and explains clearly why Eckerle Pianos are **better** than other moderate price instruments. There are thirty-four of these important reasons which you should know about, scattered along the journey from lumber yard to shipping room. Send for this Art Color Catalog today. It shows our new 1908 styles in colors, quotes lowest freight-paid prices, explains our 4 different plans of payment, and tells you in the words of other buyers just what they have found the Eckerle Piano to be.

After you have read this book

through and talked the matter over with your family, you can take advantage of our fair and square **"Sold when you're satisfied"** offer, and we will deliver to your own home, freight and delivery charges paid, the style of Eckerle Piano you prefer, and let you give it a thorough 30 days' trial. Play it yourself; let your children try it; invite your musical friends to play on it, and when the 30 days are up, let us know whether the Eckerle—"The Piano with a Soul"—has found a home with you. You take no risk whatever in trying the Eckerle Piano in your own home, and we take but very little risk in making you this offer if you are really seeking earnestly for the best piano at a moderate "Factory to Home" price. Write a postal or a letter right now and ask us to send you the Art Color Catalog of the Eckerle—the piano that is not considered sold until you are fully satisfied **that it is the piano you want to place in your home.**

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ALDOCO STEEL WIND MILLS

Only $37.40 and up for complete steel mill and steel tower. Aldoco Mills run smoothly, quietly, and easily, and require but the slightest breeze to set them in motion. They have solid tool steel wrist pins, and a special Rocker Arm Device. Our steel towers are strongly braced, well proportioned and fitted with ladders. Every mill fully guaranteed. Write us.

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Complete 8-foot wheel and 30-foot tower, total weight 940 pounds. Price.....$37.40

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NEW ALBAUGH-DOVER MODEL 5D-12 SEWING MACHINE

90 Days Trial

A $60.00 Machine From Factory to Home for

$17.95

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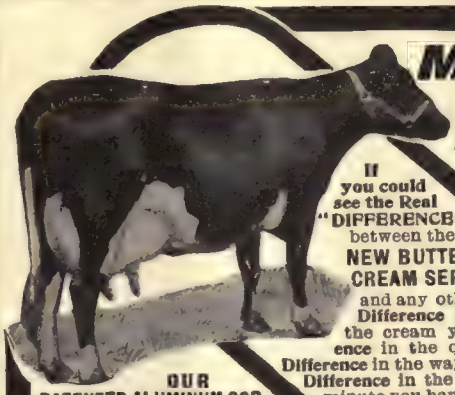

MORE MONEY From Your Cows and Much Less Work In Getting It.

If you could see the Real "DIFFERENCE" between the **NEW BUTTERFLY CREAM SEPARATOR** and any other made—**Difference** in amount of the cream you get; **Difference** in the quality of cream; **Difference** in the way the machine runs. **Difference** in the number of times a minute you have to turn the crank; **Difference** in the way the milk is aerated and purified while being separated; **Difference** in the time and trouble it takes to clean the skimming device—you would say, as hundreds of others are saying today—"I'll get the NEW BUTTERFLY CREAM SEPARATOR."

If you could see how to make easily $10 to $15 more a year on each and every cow you keep, and still do it with less work for your wife and yourself, you'd say: **"I'll get a Cream Separator."**

OUR PATENTED ALUMINUM CORRUGATED SKIMMING DEVICE

makes the New Butterfly Cream Separator **different** and **8 times as efficient** as any other machine. Every drop of milk that enters the bowl of the New Butterfly Cream Separator is actually put through the skimming process **8 times.** This guarantees complete separation, and you can't fail to get **ALL THE CREAM.** New Butterfly Cream Separators are sold as they ought to be. Not by agents, but direct from our factory to your farm **Freight paid and on 365 days' trial.** Send today for illust'd catalog.

For average use, we recommend ***No. 4½****, capacity 450 to 600 lbs. of milk per hour.*

PRICE delivered at your town— **$39.80**

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from one of the largest buggy manufacturers in America.

In a private letter recently addressed to the Albaugh-Dover Company he makes this complaint, and appeals to us to raise our buggy prices.

"Your prices are too low. We do not believe there is any other catalogue in existence (and surely no retail dealer or agent) selling a buggy as well made as your 14D-116, for instance, for less than $60.00, while your price is $50.00."

We call that a pretty convincing argument, and one that should mean more to you if you are going to buy a buggy, than all the extravagant claims made in the most beautiful colored catalog ever written. This letter proves that when it comes to buggies, **we are acknowledged privately by other manufacturers themselves to be leaders in price and quality.** Why shouldn't we tell you about it? You ought to know it, too.

We Make a Specialty of the Best Low-Priced Buggies in America

as well as the higher grades. No matter what kind of a buggy you want to buy, if you haven't gotten our catalog and price list you haven't struck **"rock-bottom"** in buggy buying yet. Our rigs are stylish, up-to-date, strong, and built **right from top to tire.** Above all, the price in every instance is as low as the quality of the job and our small profit will permit. Send today for our catalog and see for yourself why other manufacturers are complaining about our low "Factory-to-User" prices. Runabouts **$21.50** to **$82.00.** Top buggies **$28.50** to **$110.** Surreys **$58.50** to **$110.** **We have 35 styles of Top Buggies priced from $40 to $60.** Among these you are sure to find just the rig you want at a price much less than you have expected to pay. Every buggy is covered by our "Iron-Clad Guarantee." Write for catalog.

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2 to 12
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For Gasoline
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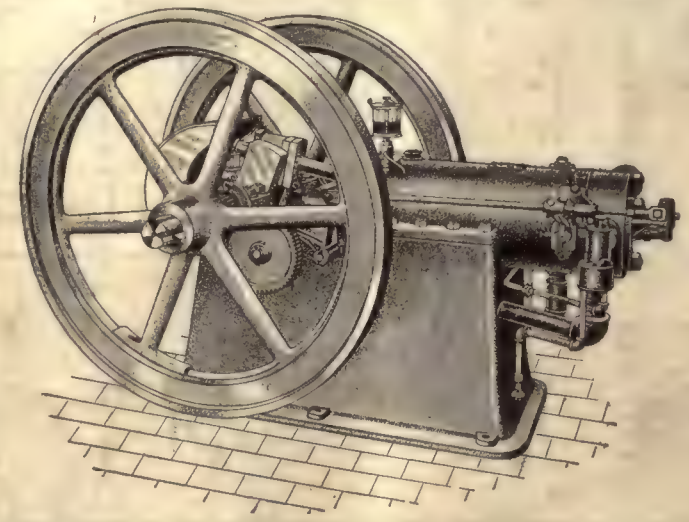

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BEST TO BUY —— BEST TO WORK

Look
Carefully
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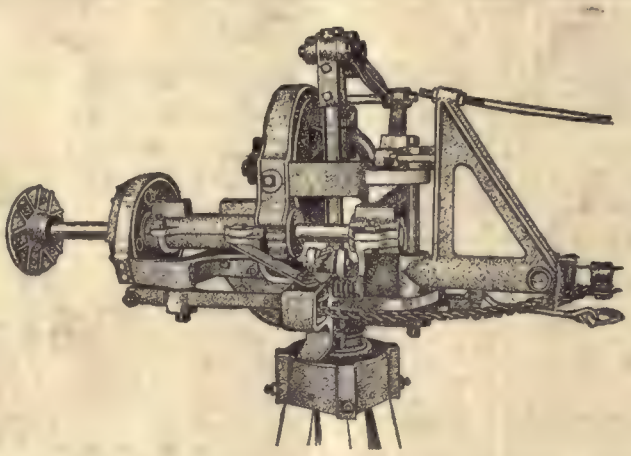
Windmill Head

Ever Made



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Extra Bearing
on the
Wheel Shaft
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Center Lift Crank Roller Rim Gears
and other good
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THE IRRIGATION AGE

PUBLISHED IN THE INTEREST OF IRRIGATION FARMERS, DEALERS IN AND MANUFACTURERS OF IRRIGATION AND GENERAL FARM MACHINERY.

VOL. XXIV. CHICAGO. DECEMBER. 1908. NO. 2

TITLE REGISTERED U. S. PATENT OFFICE

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of the AUSTIN DRAINAGE EXCAVATOR for ditch construction is that it digs a deep ditch just as cheaply per cubic yard as it digs a shallow ditch. A shallow ditch can be dug very cheaply with scrapers or graders but after the first two feet of top soil are removed the cost per cubic yard increases enormously. An AUSTIN DRAINAGE EXCAVATOR does not suffer from this disadvantage; it digs the third or fifth or tenth foot in depth equally cheap per cubic yard. It also digs a ditch with sloping sides, and "shaped" embankments complete in one operation.

POSITIVE ACTION distinguishes all our drainage and irrigation earthwork machines. The buckets of the AUSTIN DRAINAGE EXCAVATOR are positively guided in their work by a templet adjusted to the exact cross-section of the canal. The bucket of the AUSTIN ORANGE PEEL DITCHER is positively forced into the ground, there is no chance about its taking a full load—it positively must. The same is true of each of the other special machines listed below. **Each of them is designed to do a certain kind of work better than any other machine could do it.**

The Austin Drainage Excavator
The Austin Levee Builder
The Austin Power Scraper Excavator
The Austin Rolling Platform Traction
The Austin Stump Puller and Grubber
The Austin Side Hill Ditcher
The Austin Orange Peel Ditcher
The Austin Tile Ditcher

WE SELL OUTRIGHT OR LEASE

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F. C. AUSTIN DRAINAGE EXCAVATOR COMPANY

Railway Exchange, Chicago, Ill.

Morris Machine Works

BALDWINSVILLE, N. Y.

Centrifugal Pumping Machinery, designed for any irrigating proposition. Send details or specifications of what is wanted and we will recommend a pumping outfit to supply the need

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If you have a tract of non-producing ground, why not make it pay you. If you have a well of any description we can help you turn the useless soil into fertile land that will bring you in profitable returns, many times the sum expended for the installation of an outfit.

The outfit in the illustration shows one of our serviceable triplex pumps connected to a horsepower outfit, by which medium many ranchmen, agriculturists and fruit men are now securing large crops of grain, grass and other growths from the irrigated ground.

All the irrigation outfits we manufacture are exceedingly easy in action and are for operation by horsepower, gas or gasoline engines, belt driven, direct connected to motor, or ANY available power.

They have capacities of from 3 gallons per minute to 3,000 gallons per minute, and can be adjusted to suit any conditions.

Our engineering department will give their most careful attention to statements of conditions under which the pumps would have to work, and will submit expert advice on the matter.

Our Catalogue "G" is devoted exclusively to power pumps and irrigation outfits, and if interested, we will be pleased to mail a copy on request.

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HENION & HUBBELL, 61-69 N. Jefferson Street, Chicago, Ill., General Western Agents.
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New American Turbines

will improve your water power because they are EFFICIENT, POWERFUL and DURABLE.

Our line of

HEAD GATES and HOISTS

is the most complete on the market, and we have patterns for all sizes and types. Don't forget that a reliable Head Gate is one of the important parts of any power plant.

Send for Catalogue 25.

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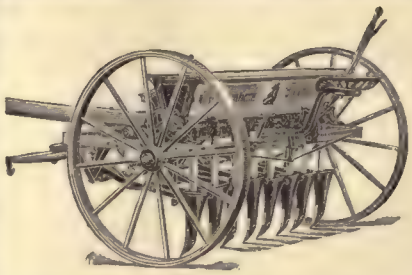
Dayton Ohio



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Plain and Fertilizer

HOOSIER HOE DRILLS HAVE BEEN STANDARD FOR MORE THAN 50 YEARS

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THE AMERICAN SEEDING MACHINE CO.

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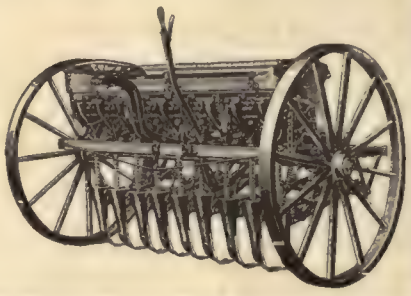
Supplied in all Styles and Sizes.

Grass Seed Attachments May Be Added.



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IRRIGATED LANDS AT REASONABLE PRICES

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Send for our booklet, "COST OF IRRIGATION." It will save you money in irrigating.

We guarantee 25% more water with the same power, or the same amount of water with 25% less power than other make of pumping machinery. We have proved this greater efficiency by hundreds of tests and we are ready to prove it again.

Bulletin No. 104 illustrates and describes irrigation machinery

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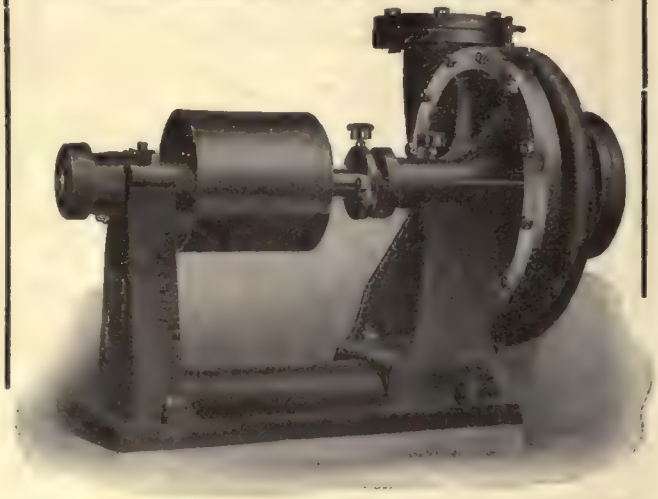

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One 5x6 Stroudsburg D. C., D. D. hoisting engine and boiler.
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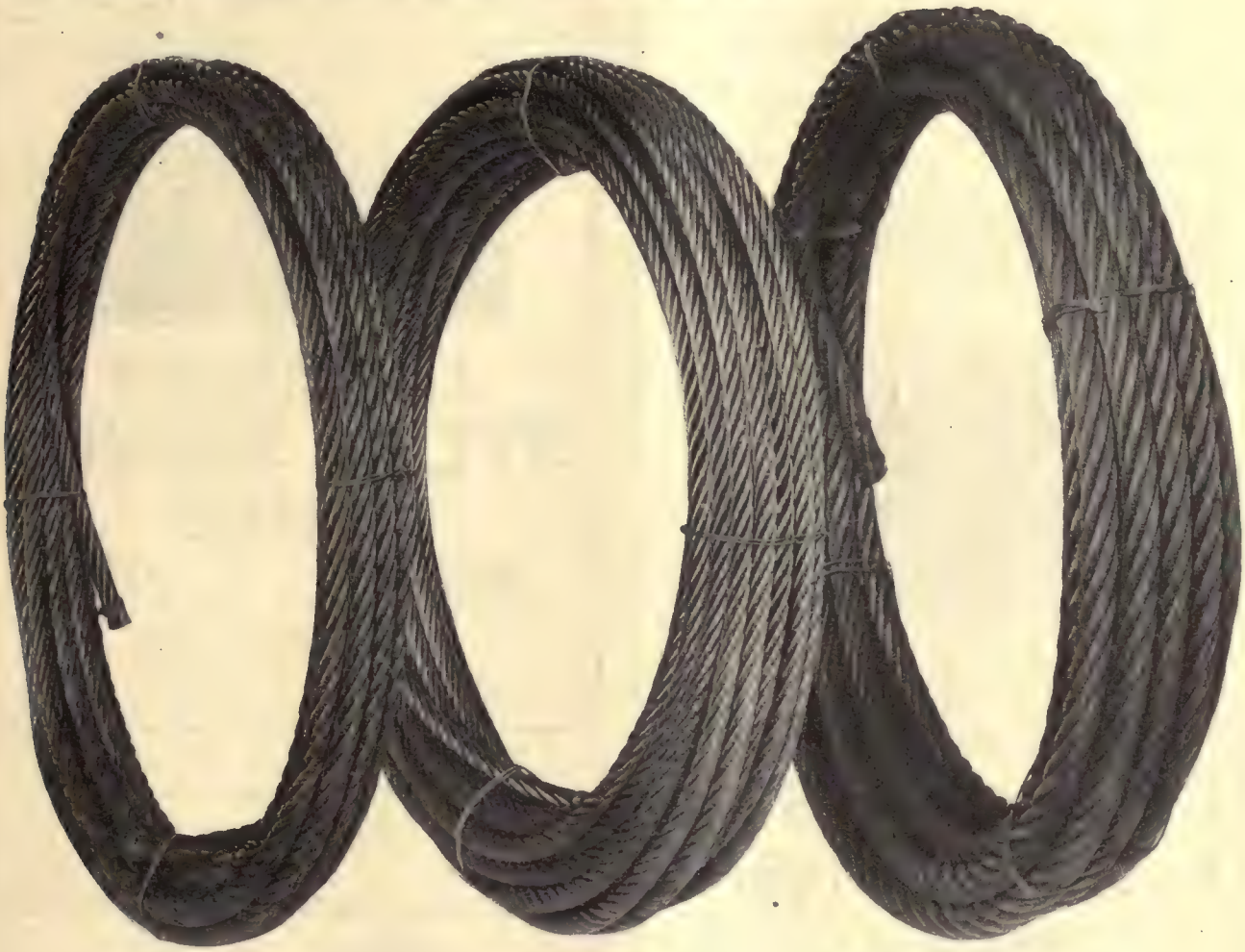

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IN the great work of reclamation of the submerged lands of the Mississippi Valley there is no more active mechanical factor than our dredge rope. We make this rope with full knowledge gained from years of experience in the hard usage to which it is subjected, than which perhaps no other service can show an equal. There is not the same risk of life that goes with the operation of an elevator or a mine hoist, but there is greater wear, necessitating a very close study of the requisite quality of material and also experience in manufacture, to produce a flexible, reliable and durable dredge rope.

We offer our rope to dredgemen with assurance of the highest ***uniform*** quality and efficiency, as proven by the many years that it has now been successfully identified with this service.

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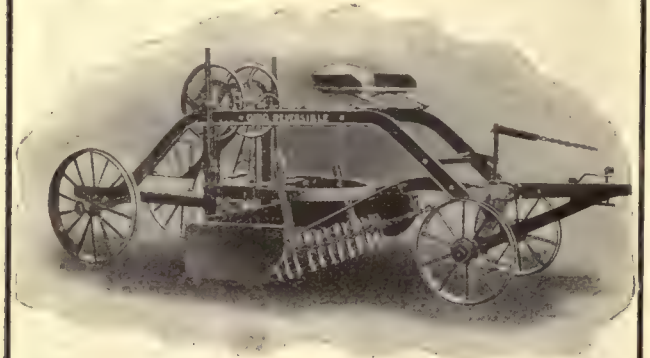
HEAVY and LIGHT GRADERS for leveling land for irrigation, making and cleaning lateral ditches. Three styles: Ohio Reversible, Digger Attachment and Fenders Removable, Blade Reversible.



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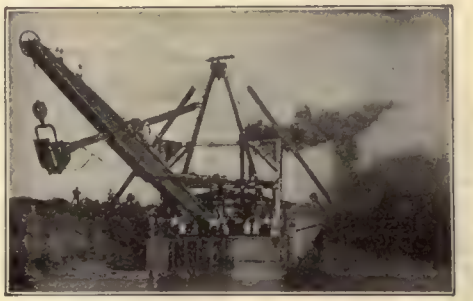
STEAM SHOVELS both Traction and Railroad Trucks, Ballast Unloaders, Placer Mining Dredges

RIVER, HARBOR and DITCHING DREDGERS



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THE IRRIGATION AGE

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THE IRRIGATION AGE
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D. H. ANDERSON, Editor

ANNOUNCEMENT.

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It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 24 years old and is the pioneer publication of its class in the world.

Owens Valley, California.

We are presenting in this issue the first of a series of articles on the Owens Valley-Los Angeles question. In following numbers additional details will be given and all of the information obtained by the editor during a recent visit to that country will be submitted to the public through the columns of this journal.

These facts will also be presented to Government officials, leading citizens and the prominent newspapers throughout the country by means of a well conducted news bureau. This bureau will also, from time to time, give information concerning the usurpation of the people's rights by bureau heads at Washington.

The west is evidently up in arms over the treatment accorded them by the head of the Forestry Bureau.

We hope to furnish some interesting facts to our readers concerning these matters during the coming year.

Investigate Land Office.

A well defined plan is on foot to petition Congressman Mondell of Wyoming to present a resolution to the next Congress calling for an investigation into the affairs of the General Land Office.

It is no secret that this office is in a hopeless tangle and that the time has come for Congress to take a hand in the interest of good government.

The administration of this office for the past few years has been conducted on the lines of reform, but the results are far from satisfactory. The trouble has been in the failure to distinguish between the honest settler and the "land grabber," which should be easy to determine.

Today every man seeking title to government land is treated as a thief until he proves himself innocent, and this sometimes takes him from five to seven years to accomplish.

Formerly all settlers were considered honest until proven guilty; under present conditions the reverse is true.

Pacific Coast Extension

The Chicago, Milwaukee & St. Paul Railway will derive much help in exploiting the country along its new Pacific Coast line through the fact of the Seventeenth National Irrigation Congress being held at Spokane next year. This great system has been engaged in extending its line to the coast during the past two years and has made such wonderful headway as to attract the attention of the world.

The officials of the system deserve praise for the work accomplished during the past year, when financial conditions were not such as to warrant a heavy expenditure on new work.

This new line is entering a section of the country heretofore almost unknown, territory rich in timber, minerals and agricultural possibilities.

There will develop along its route as a result great

opportunities for the homeseeker as well as the merchant. This system is now entering a territory where irrigation is necessary and new conditions in the way of colonization as well as in other directions will confront it.

The Northwest.

The marvelous development of the northwest during the past decade in the line of agriculture as well as the rapid growth of its commercial centers has attracted the attention of the entire country.

The exploitation of different sections is attributable to the everlasting push and energy of the citizens of that country, but to no other cause may we give as great credit for this development as in the unity of action as exemplified by the well-managed commercial clubs in each town and city.

This applies particularly to the cities of Spokane, Washington, and Portland, Oregon, as many of the smaller towns and cities have gotten the cue from organizations of this character in the cities named.

The writer has often wondered at the great and good work performed by these two commercial bodies, and the query has arisen: Do the citizens of these cities give due credit to such men as Tom Richardson, manager of the Portland Commercial Club, or Mr. Monroe of the Spokane Chamber of Commerce? Both of these gentlemen have devoted their best years to this work, in fact, it is a life work with them.

It is safe to say that no other single citizen in either state has done as much to extend colonization and bring new people and capital into the northwest as Messrs. Richardson and Monroe.

Pinchot and Pinchotism.

C. F. Robertson, secretary and general manager of the Hanover Canal Company, Mayor of Worland, Wyoming, an old-time friend of the editor, who, by the way, has been a subscriber of THE IRRIGATION AGE ever since its first number, was in Chicago recently, and in an interview made the statement that if Pinchot and Pinchotism is to prevail, Wyoming will go Democratic at the next state election, following Colorado, which has already set its stamp of disapproval upon the Pinchot policy, and he predicted that in four years every mountain state would be found in the Democratic column on that issue. If the Republican party hopes to hold these states it must repudiate Pinchot and his methods, says Mr. Robertson.

He further stated that he hoped to see a call made by the governors of the trans-Missouri states for a representative meeting of citizens to protest against the present government land policy and to inaugurate a move looking to the turning over to the control of the states all remaining public lands as the only solution of the problem. The present governmental tendency towards paternalism is repugnant to the western spirit. Why the governmental bureaus should be permitted to so conduct affairs as to nullify the acts of Congress mystifies the people and sooner or later they will rise up in their might and smite the hand of the oppressor.

Originally, the public land laws were passed and administered in the interest of the pioneer. Today, the same laws are administered to make it as nearly impossible for their occupancy and development by the pioneer settler, as the twisted construction of the law will permit, without inciting open rebellion.

The people of the west should rise and enter an earnest and emphatic protest to President-elect Taft against Pinchot and his pet hobbies.

National Irrigation Congress.

The Spokane Chamber of Commerce is actively at work preparing for the seventeenth National Irrigation Congress which is to be held in that city late in September of next year. The representatives of Spokane worked faithfully at Albuquerque to land the next meeting for their city and were successful.

Spokane is one of the most enterprising cities west of Chicago and is the commercial center for what is known as the inter-mountain country. It is one of the picture cities of the northwest and is well supplied with hotels; some of the best restaurants in the country are to be found there, so that no difficulty will be encountered in entertaining the thousands of visitors who will attend the congress, as well as the hundreds of tourists who will stop off there on going or returning from the Alaska-Yukon Exposition, which will be held in Seattle the coming summer.

A visit to Spokane is in itself well worth while, but the added attraction at Seattle will, no doubt, bring many leading manufacturers and others from central and eastern states who will take advantage of the unusually low excursion rates to both points.

The railways centering in Spokane will allow a stop-over privilege on all Alaska-Yukon Exposition tickets and this arrangement will materially increase the attendance at the Irrigation Congress.

Secretary Monroe, of the Spokane Chamber of Commerce will gladly answer all inquiries concerning the congress and the Local Board of Control will assist those who will be looking for accommodations during the congress.

Don't fail to improve this opportunity of visiting the Inter-mountain country and the great northwest; there are presented sublime scenery for the tourist; great opportunities for the home-seeker and merchant who is looking to extend his trade into this marvelously rich country, where irrigation makes all who follow agriculture under it, well-to-do and amply able to pay for what they need.

Hired Man Maxwell.

We are in receipt of a clipping from the Jackson, Michigan, *Morning Patriot* of November 27, 1908, in which considerable space is devoted to a recent issue of that nearly forgotten journal which goes through the mails under the title of *Maxwell's Talisman.*

It is very evident from the tone of the article taken from the *Patriot* that the editor of that journal has formed a wrong opinion of the forestry and other governmental affairs, through the press agent of the Forestry Bureau and through the medium supposedly owned and published by George H. Maxwell, who is without doubt in the employ of the Forestry Bureau.

The clipping goes on to say that in the great economic questions of the day—those relating to land and labor—it is always sound and instructive, "it" being *Maxwell's Talisman.*

The article then goes on to enumerate the compact statements made of the waste involved in destroying forests around the head of streams and then comes some of the dense matter suggested by Mr. Maxwell's publication on erosion, which follows denudation, and how this deposits annually untold volumes of silt and rubbish into the rivers and harbors, which Congress annually appropriates millions to clear out.

This sort of argument taken from the *Talisman* is in line with the usual "rot" published in that journal.

Erosion and denudation and deposits of untold volumes were going on when Maxwell and Pinchot and their ilk were but spirit specks in the million-year horoscopic observation of that long ago.

They are telling us nothing new. In fact, they are enlarging upon original conditions to stir the people up with what object? Some of us fully comprehend.

Assuming that Mr. Maxwell is sincere in his present work, we cannot grant him any great degree of consistency or interest in the welfare of unborn generations, in view of facts which have recently been presented to us by people whose word is unquestioned.

In conversing recently with a prominent western gentleman who is related to one of the officials of a large corporation, with headquarters in Chicago, the gentleman informed the writer that after having been appointed as a delegate to a national irrigation congress he received a letter from his relative, stating that he was glad he had been appointed, and urged him to become acquainted with the then representative of the railways at the Irrigation Congress, George H. Maxwell, and assist him in putting through a resolution favoring a repeal of the Timber and Stone and Desert Land acts, as by the repeal of these laws, so the letter from the corporation attorney to his nephew read, the corporation in which he was interested and all who were large holders of lieu land scrip would be greatly benefited; when it is known that the repeal of these laws would make it more difficult for homeseekers to obtain title to land and thereby retard western development and when it is also made clear that the man who is acting as spokesman for the corporations who would be benefited is also posing as the head of an organization whose slogan is "small farms, homes on the land," which is misleading and intended to convey the idea that he is a public benefactor—the hypocrisy of the individual is "really and truly" disgusting.

This is the same Mr. Maxwell who poses in his *Talisman* as the father of the fatherless and friend of the widow. The philanthropist who aims to aid those who are helpless and oppressed. As stated above, we can hardly consider that his attitude on the denuding of forest areas and his persistent effort along this line is sincere in the face of the facts above stated. Nor can we understand why Messrs. Pinchot and some of his friends feel it necessary to have Maxwell champion their cause. If the cause is righteous, it needs no champion, however good. If it is the opposite, they should chose a different character as champion.

We may, some day, if conditions warrant it, publish the letter mentioned above. Our only object in withholding it at this time is to protect the gentleman who wrote the letter to his nephew in Kansas.

Supreme Court Decisions

Irrigation Cases

RIGHTS ACQUIRED BY PRESCRIPTION.—

Owners of land acquired by prescription title to an irrigation ditch over the land of another, with a right to carry through it a specified quantity of water. The third person subsequently claimed to be the owner of the ditch, and executed leases therefor. The owners were in possession of the property at the time of the execution of the leases, and never entered into possession under the third person. *Held,* that though the effect of the leases might be to prevent the acquiring of title by prescription, they did not operate to divest a title acquired by prescription.—*Strong* v. *Baldwin.* Supreme Court of California. 97 Pacific 178.

PRESCRIPTIVE TITLES COMPLETE.—

A title by prescription is as effectual and complete as one obtained by a conveyance, and, unless extinguished by virtue of special statutory provisions like Civ. Code, Sec. 811, prescribing the conditions for the extinguishment of a servitude, continues until conveyed by the possessor or lost by another adverse possession for the required time.—*Strong* v. *Baldwin.* Supreme Court of California. 97 Pacific 178.

RIGHTS OF RIPARIAN PROPRIETORS.—

The nature and extent of the right of a riparian proprietor to the water of a stream for irrigation cannot be measured by any definite or fixed rule, nor can the amount of water which he is entitled to use for that purpose ordinarily be definitely determined; it being necessarily a varying quantity depending upon the use by other proprietors, and whether its use by him will be an injury to them.—*Williams* v. *Altnow.* Supreme Court of Oregon. 95 Pacific 200.

Are Government Officials Playing Fair?

Some Facts About the Owens River Valley Condition.

During the past month the editor of this journal made a trip of some six thousand miles, covering the states of Nebraska, Colorado, Utah, Nevada, California, Oregon, Washington, Idaho and Wyoming, and visited during that time many of the leading irrigation projects in the states named.

The principal object of his visit in the far west was, however, to look into the matter of the complaints made by the Owens River Valley people in Inyo county, California, and learn of their treatment by the Forestry and Reclamation Bureaus.

Many complaints have reached us and have also been presented at the two last irrigation congresses by the people from Inyo county, who claim that they are not being treated fairly by the Reclamation Service and the Forestry Bureau. A strong effort was made at Sacramento to keep the evidence in the hands of the representatives from this section from the resolutions committee. It was, however, taken up by the committee in Albuquerque this year, and after much manipulation a resolution was passed.

Through the instrumentality of Geo. H. Maxwell and some of his cohorts this resolution was so well trimmed that it will come forth with no particular feature which may be used in the interest of the complainants.

The Owens River Valley has been inhabited for upwards of sixty years by white people. The present population of the valley is about five thousand. The Owens River Valley proper is about one hundred miles in length and in continuation of this valley on the south are the Rose Spring Valley of about fifteen thousand acres and Indian Wells Valley, which borders on the Mojave desert, covering an area of about 200,000 acres. While the Indian Wells Valley is not strictly a part of the Owens River Valley, it would have formed a great part of the Federal irrigation project which was contemplated as early as 1903, had that work been carried forward.

In the year 1906 a large area of land in Owens River Valley was withdrawn from entry by order of the Secretary of the Interior. During the year 1903 this same area was withdrawn or segregated under the Reclamation Act, and later, in 1904, several sites which had been considered feasible by the inhabitants of the valley for reservoir purposes, with a view to reclaim the entire area of the Owens River Valley, were withdrawn from any kind of entry and lifted entirely away from the control of the inhabitants of the valley. This was done with the full knowledge and acquiescense of the inhabitants, who were led to believe by government engineers that the Reclamation Service would take up this work and carry it to a logical finish; in fact, this statement was repeatedly made by local representatives of the Reclamation Service, and the people were very glad indeed to co-operate with the government for the ultimate good of their section.

Surveys were made by the Reclamation officers, and the people of the valley had entire confidence in the intent and integrity of the officials at Washington. Work dragged on slowly, however, and after many protests, asking for a release of the reservoir sites and a release also from the agreement which was entered into whereby all of the rights of the settlers in the valley were practically placed in the control of government officials, about 115,000 acres set aside for the reclamation work were restored to entry, but this was not done until through some manipulation or understanding between the Reclamation and Forestry Bureaus, 35,000 acres were immediately withdrawn and placed under the control of the Forestry Bureau, which left 75,000 acres (a small tract around Bishop) free from all forms of withdrawal.

All of the balance of the land of the Owens River water shed is now held from entry under the forestry withdrawals, about 500,000 acres; notwithstanding the Smith bill which restored to entry under the Homestead act all agricultural lands in the forest reserve (which was supposed to cover all of the agricultural lands in the forest reserve).

There are over 70,000 acres of land withdrawn under a blanket order, which, eliminating the patented lands under the description, totals over 50,000 acres of the finest agricultural lands, the order specifying that "the lands are withdrawn from any form of disposition what ever under the Public Land laws until further ordered by the department for the benefit of the city of Los Angeles, California, in connection with its Owens River project." The general trend of these orders would indicate a direct effort on the part of the department to favor Los Angeles against the interest and contentions of the inhabitants of Owens River Valley.

On December 21, 1906, the department ordered the withdrawal of over 100,000 acres. On January 8, 1907, a portion of this land was restored to entry, the order stating specifically that said withdrawal and said restoration were made under the act of June 17, 1902, for reclamation purposes. The bill for advertising said restoration was paid.

On September 18, 1907, a letter was received from the department stating that this withdrawal was made "as being needed by the city of Los Angeles in connection with its Owens River project under the provisions of the Act of June 30, 1906 (Stat. 34-801), and not under the Act of June 17, 1902.

To one who is investigating in order that facts may be brought out this would, we believe, conclusively prove collusion, or attempt to mislead officials of the land office in the matter of favoring the city of Los Angeles or some monied interests connected therewith as against the settlers of the Owens River Valley. It would also tend to show that on the date of issuing the first order of withdrawal, these officials knew that the withdrawal was made for the city and not for the purposes therein stated, and to the casual observer would indicate clearly that an effort was made on the part of these officials to "cover their tracks."

From what is locally known as the conduit where water is to be taken out of the Owens River near the town of Independence for the Los Angeles project, a strip of sections of land is withdrawn from all forms of entry under the special withdrawals of the Secretary

of the Interior. A little north of the town and running east the land is similarly withdrawn for a distance of four miles.

There is not a sentence in any of the acts of Congress, so far as we are able to discover, authorizing the Secretary of the Interior to withdraw one acre for the city of Los Angeles or withhold one acre from entry.

The Act of June 30, 1906, states (Section 5) that all lands over which the rights of way mentioned in this Act shall pass, "shall be disposed of, subject to such easements." (Section 6, Public Document 395.)

There are in the neighborhood of 25,000 acres withdrawn arbitrary to the law from all forms of entry and for what purpose?

It is the general impression of the people in Independence and all other citizens throughout the valley that this withdrawal is made with the sole purpose of benefiting individuals who have been instrumental in pushing the Los Angeles water project to the fore. Another purpose in the premises is of preventing the settlement of the lands so that they may gain control of the water.

The same conditions prevail in the vicinity of Lone Pine, a town near the stream, south of Independence. The object, apparently, is to gain control, not only of the Owens River water shed, but also of the Mono Lake region, giving them the future exploitation of a water shed of upwards of 2,000,000 acres, with a possible 100,000 inches of water.

If the Reclamation Service can be kept out of this field all of this water and all of the power to be developed, running into hundreds of thousands of horsepower, will be subject to their exploitation for all time.

Our readers may, from reading the foregoing, have developed the inquiry, "Who are they?"

Personal interests and large land holders in the Los Angeles territory creep out in this investigation. It is said that a leading citizen of that city has secured a total of 16,000 acres of land which may be watered from this source, thereby increasing the value from the purchase price of from $20 to $25 per acre to at least $100 per acre. It is alleged that five individuals interested in the Colombia Trust Company of Los Angeles own or control 65,000 acres of land in San Fernando valley, which, it is proposed, to irrigate from this source. The question naturally arises, "Why should water be taken from Owens Valley and the citizens thereof, who have within the past sixty years made a garden of a sage brush plain, to enrich a section 260 miles away and allow enormous profits to be made by a few shrewd individuals in that city?"

To one who would study the condition carefully there appears to be a tendency on the part of the government officials to favor Los Angeles in this connection. It is possible that the Forestry Bureau head and the head of the Reclamation Service are not aware of the fact that the Owens Valley people have fairly good proof of the intent and conduct of the men who are attempting to take over this water for use on lands far removed from its source, and it is difficult to believe that the higher government officials will permit a move of this kind when all of the facts are laid before them.

We have secured a large amount of data concerning the connection of the Forestry Service as well as the Reclamation Service with the Owens Valley territory and this will be exploited from time to time in the columns of THE IRRIGATION AGE.

There are letters in our possession which would indicate that there has been a grievous wrong done the inhabitants of this delightful valley by government officials in Washington and elsewhere.

The man who had full charge of the reclamation work in the valley has since resigned his position and gone over to the Los Angeles people at a salary, we are informed, of $10,000 per year. This, in itself, looks rather strange to even a casual observer. Later on a history of the connection of this official and his association with reclamation work in the valley will be fully exploited in these columns.

There is much also to be said about the taking over of the Rickey land in Long Valley and at certain points along the Owens River in the valley of that name which will make interesting reading. All of these facts will be laid before the proper officials from time to time with the hope that the citizens of Inyo county may not be injured by combinations against which they have not heretofore been able to combat on equal grounds.

GOODING, IDAHO.

The Central City of an Irrigated Empire, where the Desert Has Been Made to Blossom as the Rose.

BY EDWARD T. BARBER.

On the 14th of November, 1907, the townsite of Gooding was opened to the public. Previous to that time it had been but a passing switch and a watering station of the great Oregon Short Line Railway. Surrounding it there had been a few ranches cleared of sage brush and irrigated from the waters of the two Wood rivers, which flow near the town. These ranches were the small spots of the desert which could be easily irrigated by the men of small means who used them to raise hay for their flocks and herds. But the great irrigation companies, with their millions of dollars, came at last and began irrigation works on a scale so great that the cost can only be counted in millions, and Gooding was fortunately located at the point where these great irrigation enterprises came together and met the railway. This made Gooding a natural location for a city and its backers began to let the world know its advantages. The result is a city of twelve months that might well make places of twenty years feel proud to accomplish.

A view down Main street, Gooding, Idaho. The building at the farther end on the left side is the home of the Idaho Leader, a new newspaper with a $10,000 print shop to back it up.

organized and a fine chemical engine is ready for use; a full mile of cement walks have been builded, and along Maine street, besides five or six good, substantial frame houses, there have been built four fine brick business houses, two one-story concrete buildings and one two-story concrete building; a hotel costing $50,000, built of white brick; a school house costing $25,000, also

O. S. L. Depot, Gooding, Idaho, at which ten to fifteen cars of freight are received every day and an average of one hundred cars stand unloaded on the tracks for want of unloading space.

of white brick, and about 150 dwellings, sme costing as high as $3,500. Eight buildings of brick and concrete, each two stories high and from 60 to 80 feet long, are now under construction, and a three-story opera house will be ready for the next season's pleasure.

A thousand happy, busy and prosperous people inhabit the town, and Gooding boasts of one of the best and most active commercial clubs in the west. The

West side of Main street, Gooding, Idaho, looking south. One year ago this ground was an alfalfa field and sheep pasture. City water tower and 50,000-gallon tank and the Hotel Lincoln in the background.

Commercial Club has its own rooms elegantly furnished and is making a record for its energy and push.

What has done all this? Irrigation. The magic touch of water to the desert lands that have lain since the beginning of time accumulating the necessary constituents for plant life waiting the unlocking of water to begin its labors for mankind.

Spokane Country Lands Made Productive Through Private Enterprises.

BY AUGUST WOLF.

When President Roosevelt declared, in a recent message to Congress, that no government policy for the betterment of our internal conditions has been more fruitful of good than irrigation, he had, of course, in mind also the commendable work which is being done by private irrigationists in various parts of the northwest, and, especially in the inland empire. Recognizing that the policy of reclamation is one of the wisest provisions made by the federal government, the chief executive of the nation has championed the cause and in this his influence has been of immeasurable benefit.

BLUEWATER VALLEY
NEW MEXICO

The work in the valley is progressing nicely. The settlers are ploughing their land to get it ready for planting and are building houses and making other improvements. The difference between the situation here at Bluewater and that encountered in northern latitudes is impressed upon one, as here instead of being forced to suspend outside operations at this time of year, the farmers continue ploughing in comfort practically all winter.

There is talk of a creamery being established in the valley which would, of course, enable the settler with a few cows to begin getting a cash income from the start. The fact that butter is now being shipped into the country from points as far distant as Chicago is, perhaps, as good an argument as any to show the demand for creamery products. Fort Wingate alone should use at least forty tubs of butter per week and a considerable quantity of cheese. This alone should take the product of four hundred cows. The large camps of the American Lumber Company, within twenty miles, the coal town of Gallup, within sixty miles, and Albuquerque, within about one hundred miles, would consume enough to take the milk of cows which it would take a large proportion of the products which can be raised in the valley for some time to come to feed. At the present time, early morning trains enable milk shippers to reach the Albuquerque market, where milk retails for 40 cents per gallon. Albuquerque, at the present time, ships in 75 per cent of the milk consumed there.

Mr. Walker, one of the settlers, who is familiar with the conditions under which the famous New Mexican celery is grown in other parts of the territory, where it nets as high as $1,200 per acre, says that the conditions are better for raising celery at Bluewater than where these phenomenal results were attained.

Cabbages, onions, asparagus, tomatoes, potatoes, cauliflower, beans, turnips, carrots, parsnips, peppers, Mexican chili and in fact almost all other crops do equally as well.

The Bluewater Development Company has, it is said, plans on foot to induce graduates of agricultural colleges to settle at Bluewater, which should give to all settlers the best opportunity to observe modern and improved methods together with their results.

It is seldom that an enterprise is encountered where the company having the development in charge evidences so much interest in the welfare of settlers. They expect to employ an expert in agriculture who will advise all settlers as to the best crops to plant and the proper method of handling them, as well as the proper and efficient use of the water. They do and will urge all settlers to keep up a neat appearance about their places and provide in their contracts for a board, the duty of which is to look after the general welfare of all the residents of the valley.

It is hard to believe, after looking over this beautiful valley, and seeing the class of settlers coming into it, that the impression could have gone abroad that New Mexico is a country inhabited by Mexicans employing only crude methods of agriculture and cruder methods of life.

The modern high class construction put into the plant, the crops carefully stacked or otherwise stored for use when needed, except those, of course, which have been sold, all belie this assumption.

It is not difficult to imagine the remainder of the lands under cultivation watered by the flow from two hundred and forty square miles of the wooded water shed in the Zuni mountains stored until needed in the magnificent natural reservoir, supplemented by the substantial dam and controlling tunnel constructed through the solid rock. This will indeed produce a community of which any person may well be proud to be a member.

The Art of Irrigation

CHAPTER SEVEN

By T. S. VAN DYKE

Suppose you decide to irrigate in lands, have them laid out with perfect slope and perfect level at right angles, so that you can run a sheet of water not over a quarter of an inch thick over the whole area without running fast enough to be muddy; in fact, to be as near to rain as it can be made without a spray thrower. Even a watering pot will make a sheet of water very quickly and unless extraordinary care be taken it will soon have the sheet muddy. Surely the best thing is this running the thinnest kind of a sheet in perfect lands. And yet you are not happy. In a very few days the plants that came up so fine are looking tired again

SPOKANE BOOSTERS AT ALBUQUERQUE.

Top Row, Left to Right—Arthur Hooker, Spokane; A. J. Ternent, Morrison; S. J. Harrison, Sunnyside; H. L. Moody, Spokane; W. H. Harrison, Sunnyside; W. E. Russell, Tacoma; F. A. Turner, Hoaglin; M. J. Costello, Seattle.
Second Row—C. W. Mott, Mrs. Mott, St. Paul; Dr. C. G. Fletcher, Mrs. Fletcher, North Yakima; L. G. Monroe, Spokane; C. B. Reed, Wenatchee; George H. Maxwell, Chicago; Miss Kiesel, Frederick J. Kiesel, Ogden.

In the line of municipal improvements city water works have been installed, a fire department has been and some are plainly wilting. Can it be possible they need water again so soon? If it is this way in spring, what will be the demand for water in summer?

But the plants seem to need water, and they really do. On it goes, only to repeat the same experience in a few days, when they look more thirsty than before. So far I am assuming that you are irrigating where the rainfall is practically nothing and irrigation a necessity. But you would find the same result in those parts of the semi-arid belt where the rainfall is quite important, and, in a dry spell, much the same result where irrigation is only supplimentary to a good rainfall. The land seems to need water five times as often as it would need rain. Is this the way of the boasted irrigation?

You have simply made the regular mistake of the novice. To see him perform on the desert would make the angels weep. The standard trick with such is to take a piece of land that for untold ages has never been wet more than a few inches and is dry as an ash heap for dozens of feet. Over this he spreads a thin blanket of wet earth by running water over it for an hour or so, generally less, and in this blanket he plants his crop. The idea that the dry dust below could sap the moisture downward as fast as the sun and dry air can sap it upward is the last that will ever occur to him. Amazing as the statement may seem, it takes the great majority of people years to learn this, even on the desert. If so, what may be expected where the rainfall is considerable, but not enough? Simply this—people going on for years and making money, but making less than they could make with the same amount of time and labor and never suspecting it. When things begin to wilt the regular orthodox performance is to pour on just enough water again to wet the same thin skin. Stuff revives at once to fail again in a few days and be revived again for a few days in the same old way. Whatever the crop may be, it will be inferior both in yield and quality to what it would have been if properly treated. And if it is fruit the percentage of first grade will be very low, And in the percentage of first grade is where all your profit lies, the second grade barely paying expenses, even when you are unwise enough to throw it on the market. Nothing else can result from a constant fluctuation in the vigor of any plant or tree, and if it pays at all, it proves only that it would pay heavily if it had a fair chance.

Has the reader ever seen a crop of anything grown without one drop of moisture from any source touching the surface after the planting of the seed? If not, can you imagine how it can be done? Will you believe me when I tell you that fully 80 per cent of the enormous fruit and grape crop of California is raised without irrigation and gets no rain after the fruit is set? Or, rather, the growers want no rain, though a little may come. Can you believe that corn, potatoes and the majority of garden vegetables get never a drop of water after the planting of the seed? And could you believe that for nearly all of the immense bean crop of the southern end, amounting to over twenty-five hun-

dred carloads, the seed is purposely kept out of the ground until the rains are supposed to be over, so that the weeds can be killed and the soil left fine and loose, with no danger of being packed again?

It is hard for one raised on a foot of soil lying on rock to believe this, but there are enough other places in the eastern states where a crop of corn surviving a drouth shows that the subsoil is a sponge holding moisture long after it has been exhausted on other soils. Almost any deep soil will do it, though some of the softer hard pans hold it quite as well. In the arid regions most of the soils are deep because drifted by wind and rain of ages from the hills forming the valleys and slopes, or they are alluvial deposits from rivers. In the semi-arid they are much the same, though there are good soils lying farther up the hills right on the rock or shale from which they were formed, but the rock is generally decayed so that it is porous and forms a fine sponge.

The results of filling these sponges thoroughly are wonderful to the stranger. I have about thirteen cottonwood trees lying along an old ditch that I cut off some seven years ago. They get positively nothing from the rainfall or any other ditch than the old dry one they are on and nothing from underneath because it is known to be over a hundred feet to water below. Railroad excavations show the soil perfectly dry from the surface down as far as they have gone—over ten feet. These trees get water exactly once a year, when for a week or two I turn waste water in winter into that branch to save them. During the whole long dry summer they look better than trees in Daggett only a mile away, and sprinkled every day in summer, but never wet in winter or spring. I have raised watermelons on the same desert soil fourteen pounds in weight and of good quality, without a drop of water after the seed was planted, but the ground had been heavily soaked before. These were the Chilian variety, of which the average maximum is only about twenty pounds under best conditions. There was no cultivation and they were mere volunteers from seed dropped there the year before.

All this has long been known outside of the desert. The Campbell system of dry farming is simply getting water enough into the subsoil and keeping it there. Under flooding the subsoil needs no special packing for heavy flooding will do it well enough. The greater part of the immense grain crop of California has long been raised on the same principle, one-half the ground being plowed and left fallow each year to retain the moisture in the subsoil. The grain is then planted early enough to catch all the rains of the next winter. A paying crop is quite a certainty if the weather is cool in filling time, as it generally is here.

Now all you need do is to follow these principles of the Campbell system of dry farming and fill the soil with water in winter and spring when there is plenty in most all ditches that is not wanted very badly. Plant nothing except on ground so filled; then hold that moisture there by cultivation, if your crop permits it, and you will be surprised to see how long it will be before there is any sign of suffering. If the air is moist,

A Dempster Gasoline Engine and a Centrifugal Pump Discharging Water Through a Long Line of Pipe on the Ranch of Henry Yeager in the Foothills West of Loveland, Colo. This cut illustrates the method of piping the water from the pump to a high point on the land to be irrigated.

and the sun not too hot, many things like grapes, almonds, figs, potatoes and melons will need no more that year if the crop is not too heavy and the subsoil is deep enough. Oranges and lemons and many other things cannot go so long, but even with them the difference in the amount of water needed is very great. But the tree will live. The only trouble will be in the size or quality of the fruit.

Probably the best instance of all this is the farming that has for ages been done by the Cocopahs, an Indian tribe of several hundred living wholly by farming on the Lower Colorado river, some fifty miles below the American line, and on one of the worst and most dangerous deserts of the world. There is probably no other land where so many people have perished from getting out of water in intense heat and dry air lasting about nine months. These Indians raise corn, melons, squashes and some other things and bring them to maturity solely on the water left in the ground from the overflow of the Colorado river and miles away from its regular bed. And they do it by making a hole in the wet ground with a stick and putting in the seed. No cultivation afterward is known among them. This is probably the old Egyptian style, and while the crops are far from what they could be with proper cultivation, they do prove that some ground carries water a long time when once well filled.

The great importance of the principle lies in this and no one can afford to ignore it. Even on the thinnest soils it is important, for in all there is something of a subsoil—soft rock, clay on top of the rock, hardpan that softens and holds water, or something of the sort, which you cannot afford to leave dry while you toy with a thin blanket of wet earth above it. Now if anything wilts for want of water on a dry subsoil it is always injured, often badly. A shinkage of fruit on a heavily laden tree cannot be remedied by any amount of water so as to bring the crop up to what it should have been. If alfalfa wilts on a dry subsoil, when it is between six or eight inches high and before it comes into full bloom, probably one-third of that cutting is gone and often one-half, no matter how quickly water is put on the top. But if the subsoil is wet, you may often make the whole cutting, with no water on top. Or if it goes too dry on top, there will be a slow darkening of the sunny green, which gives you ample warning, and the loss will be slight.

The folly of thin wetting is best shown in thousands of the lawns of Southern California. If a blue grass lawn is thoroughly wet to bed rock by flooding or long furrow irrigation, it will go two or three weeks or more without suffering unless too much manure has been used or the soil is too thin. A light sprinkling once a week would then suffice to keep the surface wet enough. Instead of that the sprinkler is kept running every day, the grass is all trained to surface roots and if for any reason the water fails, a very few days sees it all foxy and faded, requiring long sprinkling to restore the original green. And a few days of hot weather will kill considerable of the top, so that if it comes up at all it will be by new shoots from a root not wholly dead. Such suffering is quick and also fatal to some things, while with a wet subsoil the suffering is slow, gives you abundant warning and kills nothing for a long time.

Therefore, one of the first things to do is to find how your soil holds moisture in the subsoil as well as in the top soil. For soils of the same depth and apparently of the same texture will vary greatly in this respect. Suppose you have a soil like fine shot, with all the grains of about the same size. Such a texture would look all right and would hold more water than a mixed soil, provided you had it in a vessel so that the water could not escape. But after the water has run out the moisture remaining will be much less than in a mixed soil of a dozen sizes, from coarse gravel down to the finest dust. We have some river bottom wash in places in California of uniform size of grain, where no amount of cultivation will retain moisture in the top soil or bring any up from below, although it is only eight feet or so to sheet water from the river near by. On such soil it is common to see grain wilt in a week after a good rain, with plenty of water six feet below—something quite impossible on the mixed soil of the uplands.

If you have this kind of soil you must plant something deep-rooted that is but slightly injured, if at all, by its roots reaching water—such as the pear tree. Alfalfa will do fairly well if the water is moving, but generally not if it is stagnant. You may raise paying crops, but not big ones. A mistake in such matters means often two or more years of time as well as loss in the profit.

But you must not imagine that everything can be held up to the productive point by wet subsoil. Such things as strawberries must have surface water every few days. Every third day is not too much where the sun is hot enough. Even the plant will amount to nothing without frequent surface watering. Cucumbers will make quite a growth and the plant go through with very little surface watering if the subsoil be wet enough. But the cucumbers will be poor in quality and the yield short. To go through a long list of products in this way would be of little use, because the differing conditions of soil and climate will modify them all. I merely use enough to call attention to the principle; the application you should study out for yourself, and you cannot do it too speedily.

NOT AFFECTED BY DEPRESSION.

One Big Industry That Makes Its Business Grow and Expand During Year of Business Depression.

When a manufacturing establishment reaches out in a year of depression and increases and expands its business, while others in the same line diminish their outputs or stand still, it is because there must be some unusually good reason for it. In this instance a splendid reputation and a more-than-ordinary meritorious product were responsible for the showing made.

The Mayer Boot & Shoe Company, Milwaukee, the largest shoe establishment in the Northwest, has just closed its fiscal year and reports an increase in sales over the corresponding period of last year. This exceptional showing speaks volumes for the genuine merit of Mayer shoes, and is directly attributable to their high standard, and because of the fact that Mayer shoes have become universally and popularly known as "shoes of quality."

Most of our readers, no doubt, have become familiar with the shoe advertisements of this enterprising firm, that have been appearing in the columns of this publication for a number of years past. To those who have not yet become familiar with the extraordinary wearing qualities of Mayer shoes we would recommend a closer acquaintance by a purchase of a pair at the first occasion.

The leading brands are "Honorbilt" fine shoes for men, "Leading Lady" fine shoes for women, "Yerma" Cushion shoes for both men and women (these are exceptionally fine shoes for people troubled with tender feet).

CHARLEY'S BUTTE.

W. A. CHALFANT.

Midway between Independence and Big Pine, in eastern California, a spur of the Sierra Nevadas almost cuts Owens Valley in two. When the land was in the making, this uplift from below had accretions from craters which lie against the Sierra base a few miles westward. A broad tongue of lava juts across much of the valley's width—a veritable riot of matter which, as it flowed or fell, and as its molten glow changed to eternal blackness, took fantastic shapes, and lies in recesses, miniature precipices, caves, every conceivable roughness of surface. Affording many hiding places, it became one of the natural strongholds of the Piutes in their war against the white pioneers; and there they were lurking the day this story was acted.

Near by is Charley's Butte. A new interest attaches to it now, as the landmark of the head of the Los Angeles aqueduct proposed to tap Owens river at that point. Being only a low mound, it would be probably even yet as little regarded and as nameless as a hundred other hills, but for the affair which christened it. Many versions have been told, and some have been printed. This is the true story, as Mr. McGee's narration is remembered:

Early in 1863 a party of travelers entered Owens Valley on their way from Aurora, then a booming mining camp in western Nevada, to Visalia, California. In their camp near the later site of Owensville, on the night of March 7, were Mr. and Mrs. Jesse Summers, Mrs. Margaret McGee, her son Alney (then in his later teens), a little girl (a relative), and a negro named Charley Tyler. Resuming their journey on the morning of the 8th, they crossed the river and had gone about twenty miles, when near the present locality of Big Pine they found the body of a man who had been murdered by the Indians a few days before.

Taking alarm, a hasty flight began. A few miles further on, signal smokes were seen; and as the party passed the barrier of hills a band of at least 150 Indians came into view. Turning from the rough road they had followed, the Summers-McGee party tried to cross the river, opposite what has ever since been known as Charley's Butte. The wagon stuck in the soft mud of the bottom; the horses were cut loose. By the time the party was well out in the water the Indians were on the bank, sending arrows and bullets whistling around them, but doing no damage. On the eastern side of the river, the ladies and child were placed on the team horses' backs, the men holding to the animals' manes and running alongside. Charley, the negro, fared worse. His efforts to catch one of the band of loose horses proved unavailing; and as the whites fled for their lives, Charley was seen running and fighting with the Indians, who had by then crossed the river and were closing in on him. The fugitives went on without further interference, and on reaching a ford a few miles below, again crossed the river and made their way to Camp Independence, where they were cared for by soldiers.

"CHARLEY'S BUTTE," INYO COUNTY, CAL.

The fate of Charley was never learned by white men. He had killed several Indians in previous battles, and unless he met death outright in his last stand there may have been grounds for the surmises of death by torture. Later that fall two prospectors found the head and upper vertebrae of a man hanging in a clump of willows about two miles west of where the flight began. Their opinion was that the body had been burned, probably after death, the top of the skull having been crushed in. Whether the bones were those of Charley or of some other victim of the redskins they could not answer positively, nor can any one living, unless it be some aged Indian. Mr. McGee's belief is that Charley died fighting.

The Summers-McGee party lost all their possessions except the clothing they wore and the horses the ladies rode. A band of seventeen loose horses and the wagon, in which were household goods and $600 in

money, fell to the pursuing Indians. Some of the latter did not live long to enjoy their spoils, for among the forty-five Piutes slain in a battle near Owens lake the following month were many on whose bodies were found blankets, coins and other plunder looted from the abandoned wagon.

Mr. McGee is one of the most highly esteemed citizens of Inyo county, and his absolute fearlessness is accompanied by the usual attribute of bravery—a modesty which minimizes one's own deeds. In this I have told his story, with a few additions from local written history; and so some of the details of the flight, as told by others than Mr. McGee himself, have been omitted—details of his own personal conduct, which made him in local estimation of the affair its most important figure, next to the unfortunate negro Charley.

This was one of the incidents of four years of war, waged while a larger drama was being enacted east of the Mississippi. The government was well occupied elsewhere than in Owens Valley, and could do little toward helping the settlers. So it turned out that the pioneers largely fought their own battles, and struck the most telling blows which were to give this fertile valley to civilization. Today the government, too busy to conquer this then wilderness, is seeking by every arbitrary construction of law or official orders to nullify that victory; to deprive the people who risked their lives to win it of the legitimate fruits of their battles, by ordaining that its development shall be perpetually checked.

Reclamation Service News

The Secretary of the Interior has ordered the suspension of the contract of Messrs. Page & Brinton, of Boise, Idaho, for schedules 2 and 3 on the main canal, Payette-Boise project. On October 5 the contractors were notified that unless within five days from that time they had resumed work on their contract, with force sufficient to complete the work by December 1, 1908, the contract would be suspended. The government has taken over the equipment of the contractors and will proceed at once to complete the work by force account.

The second unit of the Umatilla project of the United States Reclamation Service in Oregon has been completed and an additional 2,499 acres will be supplied with water next season.

Developments on this project have attracted widespread interest, owing to the advantageous location of the irrigable lands, the favorable climate, and the exceeding fertility of the soil. The project is situated in a section where the growing season is long and a wide variety of crops are produced, many of which are the first on the markets of Portland, Seattle, Tacoma and Spokane, which cities are tributary to these farms. The project is essentially one of small farms, and. fully developed, is likely to become one of the most intensely cultivated areas in the Northwest.

The irrigable lands are in townships 4 and 5 N., ranges 28 and 29 E., and plats showing the location and area of the various farms which may be entered under the provisions of the homestead laws and irrigable lands in private ownership are on file in the local land office at La Grande, Oregon.

The water right charges are divided into two parts, namely, for building the works, and an annual charge covering the cost of operation and maintenance. The part for building the works has been fixed at $60 per acre of irrigable land and this may be paid in annual instalments of $6 per acre or some multiple thereof without interest. The part for operation and maintenance until further notice has been fixed at $1.30 per acre of irrigable land per annum. For new entries one full instalment of the charges for building, operation and maintenance, $7.30 per acre of irrigable land must be paid at the time of making entry and water right application at the U. S. Land Office at La Grande, Oregon. The second instalment is due and payable December 1, 1910, at the same place, and subsequent instalments on December 1 of each year, but the part for operation and maintenance must be paid on or before April 1 of each year.

For private lands and lands heretofore entered within the irrigable area, the first instalment will be due and payable December 1, 1909. All water right applicants are required to join the Umatilla Water Users' Association, Hermiston, Oregon, which has contracted with the United States, guaranteeing the payment of the water right charges by its members, who give the Association a lien on their lands.

The acting Secretary of the Interior has changed the form of withdrawal of the following described lands in Wyoming from the first to the second, in connection with the Shoshone irrigation project: S ½ nw ¼ section 19, T. 52 N., R. 102 W., 6th P. M.

The Secretary of the Interior has withdrawn from public entry, under the first form of withdrawal, in connection with the Minidoka project, the following described lands in Idaho, excepting any tracts the title to which has passed out of the United States: Boise Principal Meridian—Townships 5 and 6 S., R. 31 E., all; Township 5 S., R. 32 E., all; Townships 3 and 4 S., R. 33 E., all.

The following contracts have been awarded in connection with the Mabton lateral, Sunnyside irrigation project, Washington:

H. W. Holden, Portland, Oregon, Schedule 1, involving the excavation of about 28,000 cubic yards of material; contract price, $4,382.50.

Schedules 2 and 3 to David S. Wilson, of Mabton, Washington, involving the excavation of about 31,500 cubic yards of material; contract price, $5,918.50.

George C. Clark, of Richland, Washington, Schedule 4, consisting of 2,100 linear feet of timber flumes, requiring about 170,000 feet (B. M.) of lumber; contract price, $5,040.00.

The Secretary of the Interior has approved the execution of the contract entered into by the engineer in charge of the Payette-Boise irrigation project, Idaho, with Messrs. Conway and Wilhite of Nampa, Idaho, for furnishing certain grading equipment, labor, etc. The aggregate expenditure to be incurred under the contract is indeterminate, but it is estimated that the amount will approximate $300 per day. The contract may be terminated by the United States upon five days' written notice.

The acting Secretary of the Interior has vacated the first form withdrawal of November 4, 1904, in connection with the Dubois project, so far as it related to the nw ¼ ne ¼, s ½ ne ¼ and e ½ nw ¼ section 30, T. 14 N., R. 44 E., B. M., Idaho, and restored such tracts to the public domain, if not otherwise withdrawn, reserved or appropriated, waiving notice by publication limiting the time for settlement and entry, as the tracts are included in an indemnity school selection list filed by the State of Idaho.

The Secretary of the Interior, on behalf of the United States, has entered into a contract with the Sunnyside Water Users' Association of Sunnyside, Washington, providing for the construction of a number of ditches in connection with the Sunnyside unit of the Yakima project. The contract is in conformity with the recently adopted plan of the bureau to promote the active co-operation

of land owners. Under this plan settlers under the project are permitted to take contracts for certain parts of the work and are thus enabled to pay for the government water right in labor instead of cash.

The Secretary of the Interior has withdrawn from public entry, under the first form of withdrawal, the following described areas in Idaho: Township 6 N., R. 44 E., all Secs. 11, 12, 21 and 28; township 6 N., R. 45 E., all Sec. 18. The above described areas are included within the Teton reservoir site, to be utilized for the further development of irrigation in the Snake River Valley.

The Secretary of the Interior has withdrawn from all forms of disposition whatever, under the public land laws, about 165,000 acres of land for use in connection with the Minidoka irrigation project, Idaho. These lands lie in Townships 7, 8 and 9 S., Rs. 18, 19 and 20 E., Boise Meridian.

The Secretary of the Interior has withdrawn from all forms of public entry the following described lands, which are to be used in connection with the Minidoka project, Idaho: Townships 5 and 6 S., R. 31 E., all; township 5 S., R. 32 E., all; townships 3 and 4 S., R. 33 E., all.

The Secretary of the Interior has accepted the bid of Michael O. Neill of Shoshone, Idaho, to deliver to Dodson damsite, on Milk River project, Montana, from 1,000 to 2,000 cords of rock as needed by the Reclamation Service. The bid is at the rate of $4.45 per cord, and is the lowest of seven bidders.

The Secretary of the Interior has withdrawn from public entry, under the first form, in connection with the Truckee-Carson project, the following described lands in Nevada, except any tracts the title to which has passed out of the United States: Mount Diablo Meridian—Township 13 N., R. 18 E., all Secs. 1 to 23 and 28 to 36, inclusive; townships 14, 15 and 16 N., R. 18 E., all; township 13 N., R. 19 E., all Secs. 6, 7, 18 and 31; township 14 N., R. 19 E., all Secs. 6, 7, 18, 19, 30 and 31; township 15 N., R. 19 E., all Secs. 4, 5, 6, 7, 8, 9, 16 to 21 and 28 to 33 inclusive; township 16 N. R. 19 E., all.

In order that steps might be taken by owners of excess lands under the Orland project to sell the same prior to the time when public notice is given in accordance with the terms of the Reclamation Act, the project engineer was authorized to furnish the water users' association with a map showing the lands which would without doubt be recommended to be included in the project. The map which has been prepared shows the limits to contain 15,104 acres of subscribed land. Of this amount it has been definitely determined that 14,000 acres will be irrigated by the Orland project. All subscribed lands lying outside of these limits may be released from the terms of their stock subscription.

A Dempster 4 H. P. Vertical Four-Cycle Gasoline Engine, a No. 2 Centrifugal and a Pneumatic Pressure Tank System. The pump is elevating 20 inches of water or about 240 gallons per minute. The 4 H. P. engine runs the centrifugal pump and the pump for the pneumatic tank at the same time. The well is 20 feet deep. This plant is on the farm of Mr. Frank Hunter, Brighton, Colo.

Send $2.50 for The Irrigation Age one year and The Primer of Irrigation

GARDEN CITY KANSAS and VICINITY

BY R. H. FAXON.

The assured approach of the time when cheap electrical power will be brought to this Arkansas Valley and distributed to farmers for irrigation and other purposes gives to this section of Kansas the greatest hope it has had for twenty-five years, and may mean its complete regeneration.

Garden City and this portion of the Arkansas valley already has acquired, in recent years, many benefits and advantages peculiarly to be desired in a section lacking regular rainfall, but the completion of this new project will put into the hands of the small farmer, as well as into the towns and larger plants, the power with which at a low figure to develop land declared by experts, from those of the United States Department of Agriculture down, to be as fine as any that lies out of doors.

The management of the Kansas-Colorado Electrical Transmission Company has agreed to erect at this point one of its three large power plants, the other two being located at Florence and La Junta, Colo., having a capacity sufficient to give 200 persons sufficient horse-power to irrigate from sixty to eighty acres, depending on the nature of the soil and the lift—that is to say, the distance the water has to be brought to the surface. It must be understood, also, that this one plant at Garden City is to be built in the first place on the unit plan and that it will be added to as rapidly as the demand increases.

The Kansas-Colorado Electrical Transmission Company is chartered in both states. Work already has begun. The line proposes to run from Canon City, Colo., to Dodge City, Kan., with a branch from Garden City to Scott, a distance in all of 367 miles. The primary purpose is to establish electrical transmission for the purpose of furnishing cheap power, and coincidentally to establish a line of electric railroad for freight and passenger purposes. The railroad already is building. The management has set the date of the completion of the Garden City power plant at not later than March 1, 1909.

In the Arkansas valley is the underflow—a vast underground river—that was known to exist many years ago, but has come into use but recently, and more generally through the successful establishment and working of the United States reclamation project, known as the Garden City project, three years ago. This underflow appears to be inexhaustible, and it was on this theory, now borne out by experience, that the reclamation service established the Garden City project. In this underflow lies the hope to all development, present and future, of this section of Kansas.

The Arkansas valley proper, in Hamilton, Kearny and Finney counties, Kansas, is three miles wide, on an average—greater in some places, less at others—and comprises at least 100,000 acres of land, unexcelled anywhere. Fifteen thousand acres of valley now is irrigated, one way and another, by several canals or irrigation ditches, as follows: The Alamo, with head-gates at Syracuse; the Amazon, at Hartland; the Southside, at Hartland; the Great Eastern, at Hartland; the Garden City, near Deerfield; the Farmers, or Government, at Deerfield. Also there are various private plants irrigating small acreages and making up this total of 15,000 acres irrigated.

In addition to the 100,000 acres in the Arkansas valley proper are the uplands, under the ditches and irrigated or irrigable. The total irrigable acreage of these uplands is 75,000, and about 25,000 acres of this already is under irrigation, 10,000 acres being under the Garden City reclamation project—the government project—perhaps 65 to 70 per cent of which now actually is irrigated; and from 15,000 to 20,000 acres more under the various other ditches, including the Great Eastern and Amazon.

This leaves 50,000 acres of uplands not irrigated, but all under the ditches at present. The reason this acreage is not irrigated is because it depends on the water in the river, the ditches taking water direct from the Arkansas and not from the underflow, as it would with the cheap electrical power.

There is a third subdivision of land adjacent to the valley and part of this section; what is known as the "shallow-water area," lying north of Garden City, between here and Scott, Kan., and practically all of it in Finney County. Water is there from fifteen to thirty feet below the surface, and the character of the land is excellent. This area awaits cheap power to lift this water and place it on these lands. The "shallow-water area" is underlaid with an underground river, supposed to come from the Whitewoman, a stream in Wichita and Scott counties, and emptying, at last, into the Arkansas River below Garden City. It undoubtedly is the basin of an ancient river.

Water for irrigation usually is measured by the "second foot," which equals 450 gallons of water per minute of time. In other words, a second foot of water means a cubic foot of water flowing past a given point every second, as generally known.

A second foot of water flowing in a canal will cover two acres of land to a depth of one foot every twenty-four hours.

Under the Kansas-Colorado electrical project it is estimated by the engineers that the cost to the farmer per acre foot will not be greater than $1.50, where the lift is not more than thirty-five feet.

An acre foot is the amount of water necessary to cover one acre of ground one foot deep. Two acre feet is necessary for irrigation in an ordinary season.

The first known effort to develop irrigation in this locality was in the latter '70s, when Armentrout, Wilkinson and Landis plowed a furrow from the Arkansas river into the old Santa Fe trail, in the south part of what is now Garden City, and threw the water from the river onto their lands.

The first systematic effort along irrigation lines was when, November 8, 1879, the charter of the old Garden City ditch was filed. This ditch still is in existence.

This was known as the Garden City irrigating canal. It was a mutual company. Then came the Farmers' ditch—the Kansas, then it was known; it is the government canal now—whose charter was filed March 1, 1880. The third was the Southside, the only one on the south side of the river in the three counties, known then as the Minnehaha, whose charter was filed July 20, 1880, closely followed by the Great Eastern, filed October 8, 1880. The fifth ditch in these parts, the Amazon, was promoted by Charles J. (Buffalo) Jones, and its charter was filed November 29, 1887.

Some of these ditches were mutual concerns. All became, at one time or another, stock companies. Most of them went into the hands of receivers, and had a more or less precarious and useless existence at different periods.

The Farmers' ditch now is the outlet from the Garden City reclamation project. The Southside and Great Eastern now are owned by the United States Sugar and Land Company, with headquarters here, this company owning the new sugar factory at this point. The Garden City ditch also was later acquired by this company.

The first windmill pumping plant was erected by Henry Grace, east of Garden City, twenty or more years ago. There now is a windmill on every farm in the valley that does not have other power for irrigating purposes.

There are, at this time, more than 200 private pumping plants in this part of the valley, irrigating from ten to forty acres, and pumping from 300 to 1,000 gallons per minute. The horsepower is from five to fifteen, in each case, depending on the lift.

The largest private pumping plant in the valley is that on the big Holcomb ranch west of Garden City, which has been in operation for four years. Its horse power is seventy-five, and 500 acres are irrigated. The lift is twenty-five feet. Another large private plant now being installed is that of the Lombards of Kansas City, near Kendall.

The Garden City reclamation project was constructed by the government in 1905-6. There are 10,000 acres in the project, and 60 per cent of this is irrigated. The other

land can come in at any time it sees fit. There are twenty-three separate pumps in this project, ten on the north side of the Arkansas river and thirteen on the south side. The pumps, or stations, are 1,000 feet apart. The line of ten on the north side follows the river, while the line of thirteen on the south side runs off to the south at right angles with the river. There are from nine to twelve wells at each pump.

The Garden City project is located fourteen miles west of Garden City, near the little town of Deerfield, on the Finney-Kearny line. It has a capacity of 50,000 gallons per minute or 110 second feet. The average is about sixty-five second feet.

The power is furnished by two turbine engines, each 30-horse power, direct connected to electric generators. The power is conveyed over a direct transmission line about four and one-half miles long, to the pumphouses along a concrete canal. As stated above, these pumphouses are 1,000 feet apart. The water is collected in a concrete flume, that from the thirteen pumps on the south side being conveyed by syphon under the bed of the river to the main flume on the north side, and thence into the old Farmers' ditch just below its headgates.

Under the provisions of the reclamation act of date of June 17, 1902, the farmers agree to return to the government the cost of construction, plus maintenance, in ten annual payments. The estimated cost of the project is $350,000, or $35 per acre, or $3.50 per acre annually, plus the maintenance, which is about $2.75 per acre. After a majority of the payments have been made the project shall pass into the hands of the farmers, through their corporation, the Finney County Water Users' Association.

Under the provisions of law, no landholder may own more than 160 acres under the project, and must reside within twenty miles of the land. He must be an actual occupant. No tenants are allowed.

The construction of the Garden City reclamation project was the first great boon to the Arkansas Valley and to this particular section. The second was the arrival of the United States Sugar and Land Company in 1905. The great sugar factory here, just on the west edge of town, was built in 1906, and the first "campaign" was that year. The factory cost over one million dollars, and improvements have been made since. It has 1,000 tons capacity daily, and is an independent concern; that is, has no connection with either the Havemyer or Oxnard branch of the beet sugar business.

The United States Sugar and Land Company owns 30,000 acres of land in Finney and Kearny counties, and, as told above, owns all the ditches, or irrigating canals, in these two counties, except the Farmers', or government, Alamo and Amazon ditches. Its great source of water supply, however, comes from its gigantic reservoir in Kearny County, Lake McKinnie, named in honor of the president of the company. This reservoir, which will be enlarged before the next year's season shall begin, holds 24,000 acre feet of water. The water is stored in the fall and winter and is let out into the Great Eastern Canal when required during the season.

The operation of the Garden City reclamation project and of the sugar company's ditches, mainly through Lake McKinnie, has given rise to a very large acreage of sugar beets. Lake McKinnie irrigates probably 6,000 to 7,000 acres, though not this acreage of beets this year. The sugar company made contracts for an acreage of about 12,000 for the present season, but as Lake McKinnie did not furnish the necessary amount of water, as the Garden City project was late in installing all its machinery, and as the season was especially dry, the harvest will be only about 6,000 to 7,000 acres for the present season. At this, the sugar contents of beets being exceptionally high, the crop will be about 60 per cent, which means money to both farmers and factory, though no great amount. The factory opened in October and will run until the supply is exhausted.

The success of the Garden City reclamation project has been such that the sugar company now is erecting a pumping plant on the south side of the river at an estimated cost of $250,000, to irrigate about 6,000 acres and supplement the work of the government plant and Lake McKinnie. This plan will be paterned closely after the reclamation plant, using about 500-horse power.

On Farm of A. W. Longley, near Bishop, Cal.

The sugar company's pumping plant is a testimonial to the underflow, the success and merit of the government plant, and to the coming of the Kansas-Colorado electrical project. There will be seventeen pump stations in the sugar company's plant. The formation or arrangement will be similar to that of the government plant. About a dozen test wells are down, and satisfactory tests are being made daily. The plant will be ready for operation by next season.

Another big thing that has come to this section is the Garden City national forest reserve. This stretches from Garden City to the Colorado line, on the south side of the Arkansas River, in what is known as the sand hills country.

The original Garden City reserve, set aside by presidential proclamation in October, 1905, included 97,000 acres. Last spring it was further added to, the later document calling for 305,280 acres. There is not that acreage, however, for there is considerable railroad land that will have to be segregated. The forest finally will comprise about 200,000 acres, or perhaps 225,000.

The Garden City forest still is in embryo, but work is being pushed as rapidly as possible by the government. One section has been set out this year, or 135,000 young trees in all. Of this number 80,000 are pine, of the western yellow variety, and 30,000 mulberry.

The Garden City forest was established as a separate unit, with the result that it now has a superintendent and several assistants, with offices here. A nursery also was established, as the transportation of young trees from the Halsey, Neb., nursery was found inadvisable. At this nursery, just west of here, great progress has been made this season. Locusts have attained a height of three feet since May 15. There are eight seed beds, where the young pine, from the seed, have grown four inches. They are very delicate, but will be ready for transplanting next spring.

The sandhills country in the Garden City forest contain a few trees, either stray seedlings here and there, or the remnants of old tree claims. There is a good quality of bunch grass growing on the reserve, and about 6,500 head of cattle have been pastured there this season. This is productive of revenue to the government, of which the state gets 10 per cent for school purposes. The year is divided into two seasons for pasturing, and the price per head charged by the government in the summer season is thirty-five cents.

THE NORTH PLATTE PROJECT.

BY G. L. SHUMWAY.

The North Platte Project, initiated by the Federal government in 1903, has reached the stage of actually supplying water to forty thousand acres of the finest soil in the United States, and in 1909 the works will probably supply forty thousand more acres. The progress of the work since Secretary Garfield's recent visit to the valley seems stimulated; under the able management of Engineers I. W. McConnell and Andrew Weiss, we expect the best results.

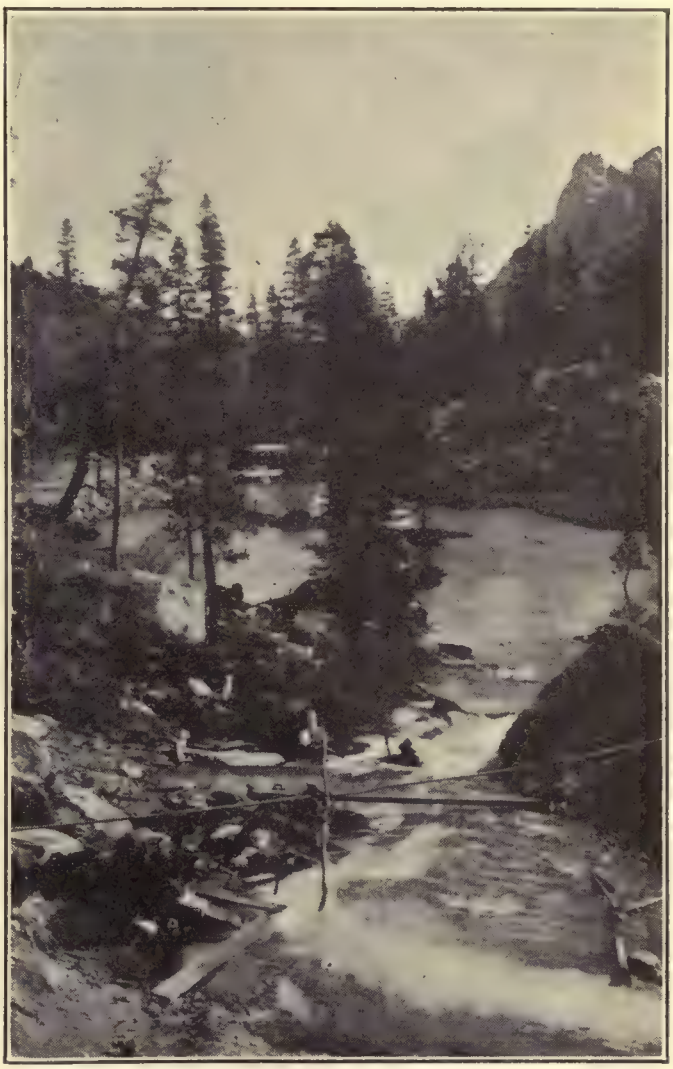
We confess that while Mr. John E. Field was project engineer, many details of management merited criticism, because Mr. Field was more of a politician than an engineer; but even during his regimé, the unimpeachable character and sterling worth of Mr. Weiss radiated up out of the fog. Mr. McConnell's experience, while not altogether dissimilar, possessed less of a handicap than that of Mr. Weiss. They have had a difficult task, but are working manfully, and since the encouragement of the visit of the Secretary of the Interior, the work is being more vigorously prosecuted.

While mentioning the personnel of the service here, it is quite proper that a special mention and commendation be also given Mr. E. D. Newman, the courteous chief clerk at the government headquarters. Mr. Newman exemplifies the more modest type of officials now in charge. He and the engineers are far more anxious to do their duty well and merit approval than to figure in grand stand plays. This quality is as wholesome as it is rare, and we predict, if ever there is an investigation of the North Platte Project ordered, any important irregularities will antedate the time when the present officers came into control.

We anticipate that the script plan, which has been adopted, will work wonders towards finishing uncompleted portions of this and other uncompleted projects. This script probably found its original inception about simultaneously in several of the projects, and was born of conditions. It was first brought to our attention by the wish of one settler to work out his water right. The Scottsbluff Commercial Club discussed it, and sent three representatives to Denver to confer with Secretary Garfield, in June of last year. Mr. Garfield instructed Mr. Newell to come up and see if he "could not work up something" along that line. Mr. George H. Holdredge, general manager of the Burlington, was then in Denver, and as it meant development of territory along Burlington lines, he volunteered a special train for the party.

Into the late hours of that night, script plans were discussed, which discussion was participated in by Messrs. Newell and Davis of the service, Senator Thomas H. Carter, Congressman Frank Mondell, and others. Senator Carter, with his usual versatility, outlined practically the plan which was subsequently adopted.

This plan is to have the Federal engineers work out certain portions of the main canal or distributing systems, and permit water users to do the construction work at prevailing prices. For this they are to receive



On Bishop Creek, near Bishop, Cal.

time slips and certificates which, duly certified by the engineers and Water Users' Associations, are applicable in payment of water rights. The advantage of this system is that actual necessary work may be done a year, or even several years, before actual cash would be available under the original plan. Script passes in the form of vouchers through the United States treasury as fast as paid in, but some of it may not be used for two, three, or four years after issuance.

The North Platte Project ultimately contemplates to supply about half a million acres with water, and is divided into five divisions, all to be supplied by the North Platte River, supplemented by storage waters in the Pathfinder reservoir. This reservoir will hold over a million acre feet and is formed by a natural basin at the junction of the Sweetwater and North Platte rivers. A dam of steel, concrete and masonry 215 feet high and about 300 feet long fills a narrow gorge in the granite outlet from this basin, and the flow of the river below is to be regulated by steel gates set in tunnels through which the water must pass.

This dam is more wonderful in proportion and usefulness than the famous Assouan dam, on the Nile, and will cost, when complete, about one and a quarter million dollars, which is charged against water users pro-

King's River Canyon, California.

portionately to the acreage supplied. The present height of this dam is about 130 feet.

However, a broader view of the work which this dam performs in preventing floods and damage along the Platte, Missouri and Mississippi rivers, its aid to navigation in holding flood waters in check until low water periods, its preventing strain upon the levees and retarding sediment, renders a conclusion that this cost as well as the cost of other reservoirs, really belongs to river and harbor improvements, or inland waterways appropriations.

Five canal systems are eventually to be supplied from this fountain head, namely, Casper, Douglas, Goshen Hole, Laramie and Inter State. The Inter State is the first, having been constructed for a distance of ninety-five miles, and the lateral systems are nearly complete. The main canal is builded most substantially, with concrete headgates, flumes, waste-ways, and siphons, wherever required. The intricate network of lateral systems are supplied in like manner with concrete "drops," headgates, flumes, siphons and culverts, and convey the water to each land unit.

Land units were fixed at eighty acres of irrigable land, that being, in the opinion of the service, the maximum amount needed for a family, or that one could competently care for. With intensive farming, such as must ultimately come, this acreage will be ample, for when in sugar beets, onions, cabbage, or fruit, ten to twenty acres will keep a person comfortably busy and profits will be abundantly large. With alfalfa, potatoes, and the like, eighty acres will leave but little idle time for the prudent husbandman. Alfalfa now produces three cuttings, or five to seven tons per acre per annum, and finds ready market at six to eight dollars per ton. Potatoes yield 200 to 400 bushels per acre, and usually bring a cent a pound or better—now about one and one-half cents per pound. Sugar beets are four dollars and a half per ton and yield twelve to thirty tons per acre. Oats yield seventy to one hundred and fifty bushels per acre. A single oat head in the writer's possession contains one hundred and ninety-nine well developed grains.

The advantages which the North Platte project possesses over most other projects are its latitude, 41 to 42 degrees north; its altitude, 3,800 to 4,200 feet; its railway connections, and its nearness to the principal markets.

WILLISTON IRRIGATION PROJECT.

Irrigation is an experimental proposition for the North Dakota farmer and the construction of the Williston project is an experiment from an engineering standpoint. There were so many new elements that entered into the construction and operation which had never been tried before that the engineers had to feel their way along and overcome the difficulties as they were met. The pumping of the water into the irrigation canal was a new method not tried in this section of the country. The Missouri river, from which the water is taken, presented difficulties to overcome that were entirely new; the fuel for producing the power was new and had not been tried on a commercial basis; the soil and climatic conditions are peculiar to the locality and different from those at other places where irrigation has been tested. All these combined are causes that make irrigation difficult at the Williston project and cause the constructing and operating engineers and the farmers many disappointments, until such time as the difficulties are overcome and the true method established. The amount of power required to lift a specified amount of water to different elevations is known; the amount of water required to cover a given area with a certain number of inches of water is also easily computed; the size, number and capacity of the pumps and the relative size of all power producing equipments necessary to pump that water are established facts well known to the engineering science. There is no guesswork about these matters. The unknown quantities that enter into the Williston project is the mud in the Missouri river water, the unsafety of its bank and the kind of fuel used in producing the power. The amount of sediments in the Missouri river water is enough to fill the water canals if pumped directly into them from the river. Some means had to be provided to rid the water of a large per cent of these sediments before it is let into the canal system. The location of the main intake pumping station had to be settled some way, but it would not do to build a permanent one on the bank of the river, as it would be liable to go down, bank and all. The means of producing power had to be supplied with native coal, a fuel with power-producing qualities not fully known and the cost of mining the same an unsettled problem. These were matters that had to be estimated from datas secured from the best available sources. To the farmers in this section irrigation was a new problem and looked upon by many with suspicion. The rules prescribed and conditions imposed on the land owners was deemed by many to be unreasonable and unjust.

In Owens River Canyon, California.

So far the construction and operation have been a continuous series of experiments. In the matter of pumping station for the main intake at the river it was decided to place the pumps on a floating barge and

fasten the pumps to the main intake pipes, each pipe being supplied with two ball and socket joints in order to permit the barges to adjust themselves to the rise and fall of the river, which is a difference of seventeen feet between high and low water marks. The barge is sixty by twenty-four feet and has three centrifugal pumps, with a capacity of pumping thirty cubic feet per second or a combined capacity of ninety cubic feet per second, or enough water to cover 160 acres with 12 inches of water in twenty-one hours. The pumps are run by electric motors supplied with power from the central power house. The barges have been found to be satisfactory during the pumping season, but are a source of expense in the fall and spring, as they have to be placed on the land during the winter to keep them from being damaged by the ice in the spring. There is a probability of a stationary station being built when the bank of the river is riprapped and made safe. In order to dispose of some of the sediments in the water and prevent the canals from being filled, a settling basin was built with the intake about one hundred feet from the river. This basin is 400 feet long, 125 feet wide and 10 feet deep, and holds enough water to cover eight acres of land with twelve inches of water. The sediments that gather in the settling basin is sluiced back into the river. The problem which is not settled in that connection is how to loosen this silt in the bottom of the basin so as to get it back into the river. But that is a matter that will be worked out to a satisfactory solution. The basin is constructed of dirt, banks on the inside being protected with brush staked down to keep them from being washed by water.

The central power house is situated three miles north of the city. The building is constructed of cement concrete and is 92x76 feet. There are six water tube Sterling boilers, with 250-horsepower each. There are three smokestacks 54 inches in diameter and 135 feet high. These furnaces are also supplied with forced draft. There are two electric generators or dynamos and two steam turbine pumps, with a number of auxiliary equipments. From this station power will be transmitted to all the pumping stations in the Williston and Buford-Trenton projects. The power house is now being enlarged by an addition of 44 feet and additional boilers and apparatuses sufficient to approximately double the power-producing capacity of the plant.

The mine is situated about one-quarter of a mile from the power house and has a vein of 9 feet. The coal is dug and placed on cars holding 1½ tons. These cars take the coal to the crusher on an inclined track, making any other power for hauling unnecessary. The crusher breaks the coal into lumps of even size and from there it is elevated and distributed into four bins directly in front of the boilers. During part of July it required about 100 tons each twenty-four hours, and took 2,338 tons during the whole month.

South of Hillside Lake in Sierras, near Bishop, Cal.

The head of the main canal is at the settling basin and extends north to the power house and is about four miles long. The water is let into the main canal through a concrete steel siphon under the Great Northern tracks. The main canal has a capacity of 100 cubic feet per second or enough water to cover one acre of ground 12 inches deep in eight minutes.

One mile down the main canal is located pumping station No. 2. It is supplied with two pumps, with a capacity of pumping 35 cubic feet of water per second. At this station the water is forced through pipes into the head of another canal, which is 24 feet higher than the main canal. About one mile west of station No. 2 is station No. 4. This is supplied with one pump, with a capacity of 20 cubic feet and lifts the water 27 feet into another canal. The canals in this unit, as a rule, carry the water north and are branched to suit the elevations of the land. Most of the excavating and building of the canals was done in the fall of 1907.

Final opening of the first unit was made by public notice March 27. The construction work on that unit as far as then extended was completed. The barge was launched May 6, the generating power plant started May 8, and water pumped into the canal on May 11; 8,500 acres was then under irrigation. All pumping stations were in operation May 16.

The first application made for water right was June 11 and the first request made for water June 12. The first water for irrigating purposes was delivered June 23. Only three requests had been made to that time. There was delivered water in June on request for irrigating, enough to cover 138 acres 12 inches deep. In June this was increased to 1,065 and in August it amount to 315 acres. This makes a total of 1,515 acre feet used in the season. There was a total of 1,515 acre feet used for irrigating purposes.

It will be noticed that over two-thirds of all the water used for irrigation was used in July. The amount of coal used during the season was 360 tons in May, 754 tons in June, 2,338 in July and 1,770 in August. During August a large amount of coal was used for the purpose of testing the various equipments which were put in under contract.

It will also be noticed that nearly 45 per cent of the coal used for the season was used in July. The result was that during this month the Reclamation Service was crowded to the limit and the water could not be supplied as fast as desired.

The conditions under which irrigation was tried at this project this season and the results obtained are not such that any reliable estimate can be made as to the amount of crop that can be raised. But where comparisons could be made the crop on the irrigated land was at least double that on adjoining land not irrigated. The crop was in many instances damaged before request was made for water. That and the inability of the Reclamation Service to supply water as fast as desired often resulted disastrously to the growing crop. Better results are expected next year. The Reclamation Service has gained experience, and with increased capacity of the power plant, it will be better able to meet the demands. The farmers are more favorably inclined and will give it a fair trial. The State Experimental Station is going into extensive experiments and the knowledge gained by them will be distributed to all interested free of charge. The Reclamation Service is very much interested in making this experiment a success, and the indications are that it will be. Irrigated farming will open a new area for North Dakota agriculture. The tendency has always been to skim over too much ground, but success under irrigation requires concentration of tilling more than on the number of acres.

Send $2.50 for The Irrigation Age one year and The Primer of Irrigation

THE PROGRESS OF SUB-DIVISION IN IDAHO UNDER THE CAREY ACT.

June, 1909, will witness the subdivision of thousands of acres more of irrigated lands in Idaho under the Carey Act, a brief description of which follows:

The Idaho Irrigation Company, Limited, is incorporated in accordance with the laws of Idaho, to develop certain lands by irrigation under the Carey Act.

It has secured the segregation of an extensive tract of public land adjacent to the town of Shoshone and surrounding the town of Gooding in southern Idaho, with a site for storage reservoirs and rights of way for canals, and the necessary permits to appropriate and divert more than an ample supply of water. A contract has been entered into with the state for the construction of complete irrigation works and the sale of water rights.

A dam for the diversion of water to one of the tracts and about fourteen miles of main canal leading to that tract have been completed.

The following are the directors, whose names are so widely and favorably known in the business world that their association with the company assures the success of the undertaking without doubt or question:

F. H. Buhl, capitalist, Sharon, Pa.; president of Twin Falls Land & Water Co., Twin Falls, Idaho.

Loring N. Farnum, third vice-president and general manager of construction, J. G. White & Company, Inc., New York, N. Y.

Fred W. Gooding, vice-president of First National Bank, Shoshone, Idaho.

R. L. Hoguet, attorney, of the firm of Ivins, Mason, Wolff & Hoguet, New York, N. Y.

T. A. Howell, of the firm of B. H. Howell, Son & Company, New York, N. Y.

C. B. Hurtt, president of Northwestern Investment Company, Boise, Idaho.

James H. Post, president of The National Sugar Refining Company, and director of Cuban-American Sugar Company.

Frederick H. Reed, first vice-president of J. G. White & Company, Inc., New York, N. Y.

L. C. Rose, vice-president of Colonial Trust & Savings Bank, Chicago, Ill.

J. G. White, president of J. G. White & Company, Inc., New York, N. Y., and chairman of board, J. G. White & Company, Ltd., London, England.

The management of the Company is under the general direction of its board of directors, who will, in handling engineering and other details, have the assistance of the organization of J. G. White & Company, Incorporated, with its large staff experienced in engineering, construction and management.

The contract with the state provides for the transfer of ownership and management of the irrigation system to the purchasers of the water rights on terms that fully secure the bondholders. It provides also for an ample assessment to pay for operating and maintaining the entire system. This will be expended under the direction of the Company until the control, including the repair and up-keep, of the irrigation system shall pass to the owners of water rights or shares in the reservoir and canal company.

The estimates provide for the construction of a storage dam and the necessary diversion dams, canals and ditches for the watering of 125,000 acres, which can be increased to provide water for 150,000 acres at relatively small increase cost.

On one of the tracts of the project, on which the new town of Richfield is located, a complete diversion dam with head-gates and about fourteen miles of main canal have already been constructed. It is planned to spend a moderate amount of money necessary to develop this town site, which is located on the Ketchum Branch of the Oregon Short Line, about twenty miles northeast of Shoshone. Richfield has a splendid temporary hotel, postoffice, up-to-date general merchandise store, two stores of lesser importance, several fine residences and a number of others in course of construction. The townsite contains approximately 1,900 lots, several of which have been sold for prices ranging from $280 to $1,000, respectively. A second town will be located on the new segregation on the main line of the Oregon Short Line east of Shoshone.

The Company proposes to expend about $500,000 for construction on the project during 1908, and the balance required in 1909 and 1910.

The work on the ground will be carried out under contract by J. G. White & Company, Incorporated, of New York, N. Y.

Water will be taken from the Big Wood and Little Wood rivers, which are important tributaries of the Snake. The natural flow of the streams is more than sufficient to water all the lands during the first part of the irrigating season. During the latter part of the season the natural flow of the rivers will be supplemented by water supplied from an impounding reservoir to be built by the Company, with a capacity of 190,000 acre feet. The water rights and the amount of water available are ample for the complete irrigation of at least 150,000 acres of land, and have been so certified by the State Engineer of Idaho, who has control of the appropriation, diversion and apportionment of all streams and surface waters within the state. The engineers of the Company have laid out the irrigating system to the satisfaction of the State Engineer, who has, under the state law, not only approved the sufficiency of the water, but also the quality of the land and the adequacy of the proposed system. Inasmuch as without his official determination of the adequacy of the water supply available for irrigation purposes, etc., no company is allowed to take up lands or water; the fact of his approval is a guarantee of the merit of the project. Several engineers of J. G. White & Company, Inc., have independently examined into the sufficiency of the water supply and engineering details and have endorsed and approved the whole project.

The State Land Board of Idaho, with the approval of the Secretary of the Interior, has segregated about 110,000 acres of public lands to the project. There is sufficient additional land not segregated, but in private ownership, lying under and near the ditches of the Company, to make a total of 125,000 acres, for which acreage the present contract with the state allows the sale of water rights.

The Company has recently applied for the segregation of an additional tract. This application has been recommended by the State Land Board and forwarded to Washington for final approval of the Secretary of the Interior. Upon completion of this new segregation, the State Land Board will be asked to authorize the sale of water for a total of 150,000 acres.

All lands to be watered are favorably located on the main line of the Oregon Short Line, and partly along the Ketchum Branch of that line, near Shoshone. They are just north of, and of the same excellent character as, the Twin Falls tract opened in 1905, and which has been the most pronounced success in the history of American irrigation, and which assures the rapid sale of the land with the accompanying water rights of the Idaho Irrigation Company.

The topography of the lands is well adapted to their irrigation, and the soil is of the highest quality for agricultural purposes, consisting of deep, finely divided loam of a dark brown color. The water penetrates this rich soil and does not run off the surface as it would on heavy clay. As the soil is underlaid by rock at a considerable depth, it retains the moisture for a long time and gives it up to the crops as needed. The climatic conditions are practically ideal for plant growth when water is supplied, so that under irrigation the lands will produce abundant crops of wheat, barley, oats and other grains, alfalfa, sugar beets, potatoes, and the finest quality of apples, pears, plums and other fruits, and in fact anything that can be grown in the temperate zone. Yields per acre of 85.5 bushels of wheat, 84 bushels of barley, 119 bushels of oats, 524 bushels of potatoes, 22 tons of sugar beets and 9 tons of alfalfa in the second year have been obtained on land of the adjacent Twin Falls tract, on which the conditions, location, soil, etc., are the same as on this tract.

View of Pumping Plant on Ranch of Tarr & Sellers, Platteville, Colo. Pumping Machinery was Installed by the Dempster Mill Manufacturing Company of Beatrice, Neb.

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"Potato Experiments," by R. A. Emerson, a bulletin issued by the Agricultural Experiment Station of the University of Nebraska, is a treatise of much value to agriculturists.

The photographs which are being reproduced from time to time in the columns of THE IRRIGATION AGE have been produced by the Albaugh Dover Special Folding pocket camera. This camera has proved very efficient in its operation and those who are in need of something of that kind would do well to correspond with The Albaugh-Dover Company, Chicago, Illinois.

Books on Irrigation and Drainage

The *Irrigation Age* has established a book department for the benefit of its readers. Any of the following named books on Irrigation and Drainage will be forwarded, postpaid, on receipt of price:

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Irrigation and Drainage, F. H. King	1.50
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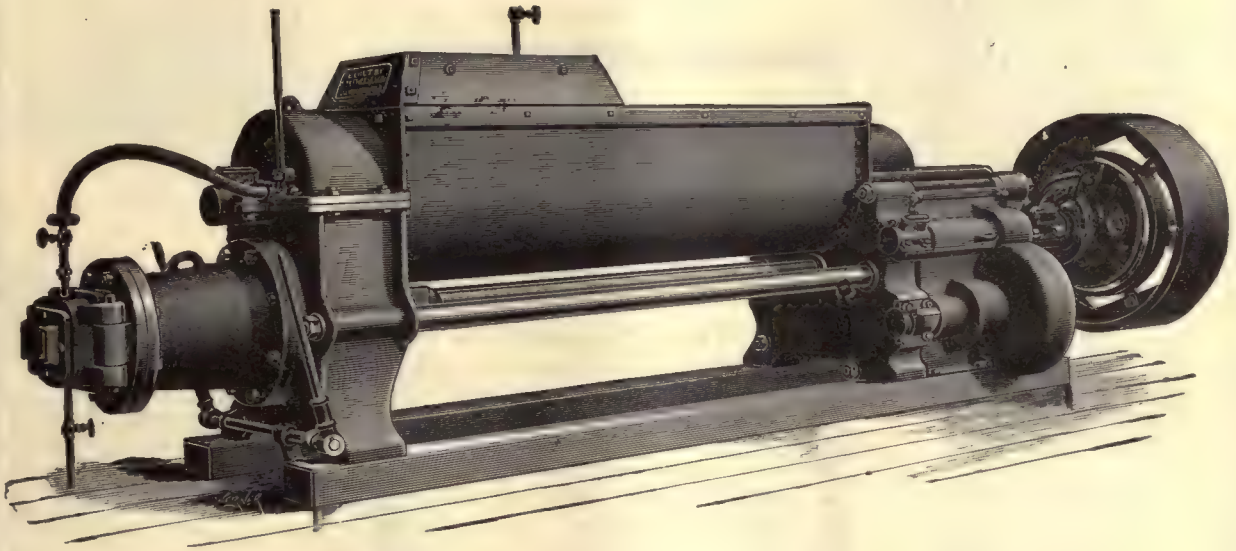

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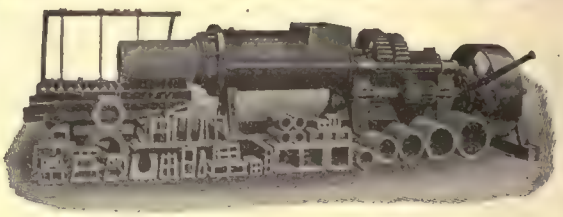
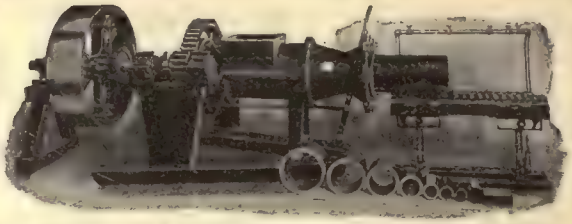
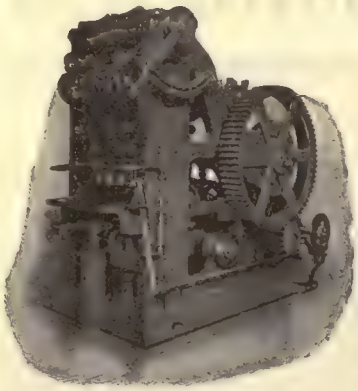


Centennial Auger Machine



Mascot Auger Machine



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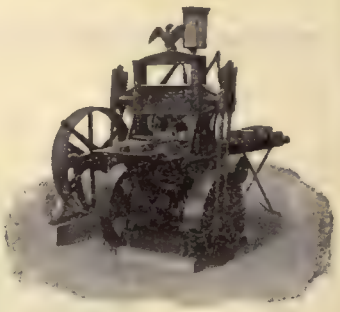

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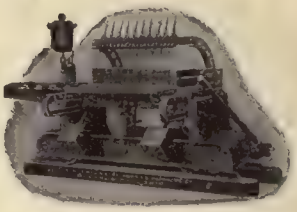

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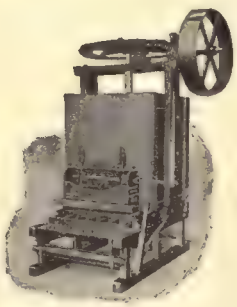

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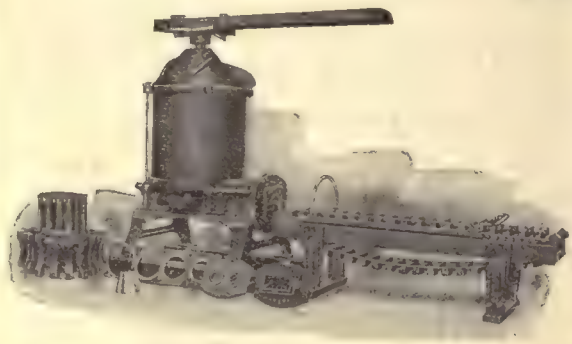
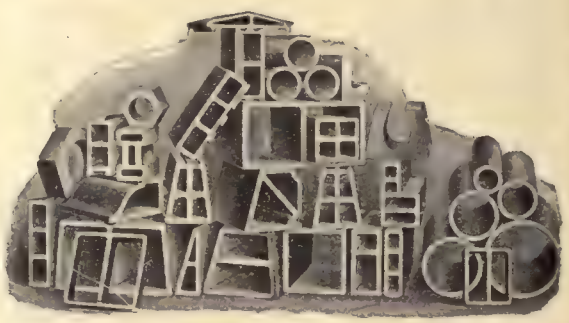


Horse Power Plunger Machine



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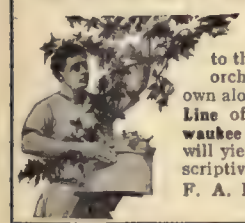

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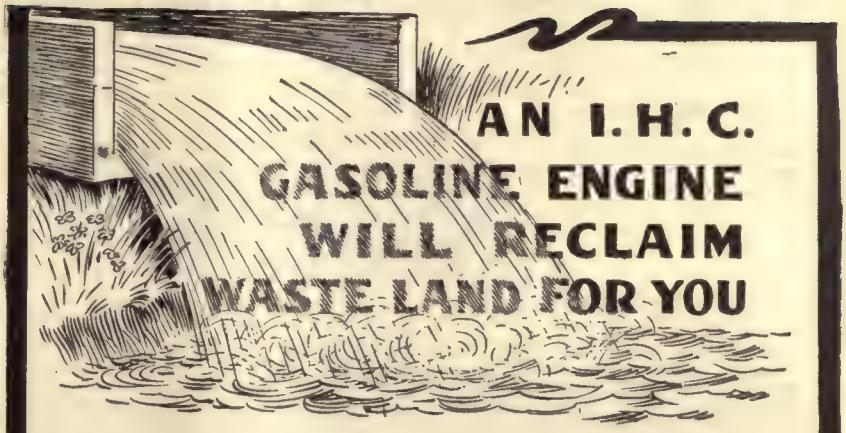

Have you ever thought of the possibilities of ten, twenty, or more, acres of dry land if you had an I. H. C. gasoline engine to pump water to irrigate it?

The land without water is practically valueless. It can be had for a few dollars per acre.

With the land under water you can raise bumper crops of grain, potatoes grass, fruits and vegetables.

I. H. C. gasoline engines operate powerful pumping machinery.

They enable you to reclaim waste land and to make it worth anywhere from $25 to $200 per acre.

They require but little of a man's time to care for them. For the most part, the operator may go about his other irrigating or farm duties. The engines, when supplied with fuel and started, practically run themselves.

Water can always be had somewhere. The problem is to get it upon the land. I. H. C. engines enable you to take water from low lying ponds, sloughs or running streams and raise it so that it is available for irrigating the higher lands.

In many places farmers are irrigating from wells, or are using the underflow. I. H. C. engines enable them to pump the water where it is wanted and to farm their lands at a good profit.

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Or have you your eye on a tract you would like to homestead if you could irrigate it?

Investigate the I. H. C. gasoline engines and see how well they will solve these problems for you.

International local agents will supply you with catalogs and all particulars. Or, if you prefer, write to the nearest branch house.

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If there is a stream, spring or pond near by and have running water wherever you want it.

Pumps Water With Water, works continuously without attention. No expense for power, nothing to get out of order. Raises water 30 feet for each foot of fall. For Home, Farm, Irrigation, and all purposes. Over 7,000 in use. Free Plans and Estimates furnished. Write Today.
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until you get my "Leader Fence Book" and learn how to secure the cheapest and best all-wire field and yard fence made. Pay no royalty to trusts or factory combinations. I challenge any and all fence makers to equal the "Leader Fence" in strength, durability and price.

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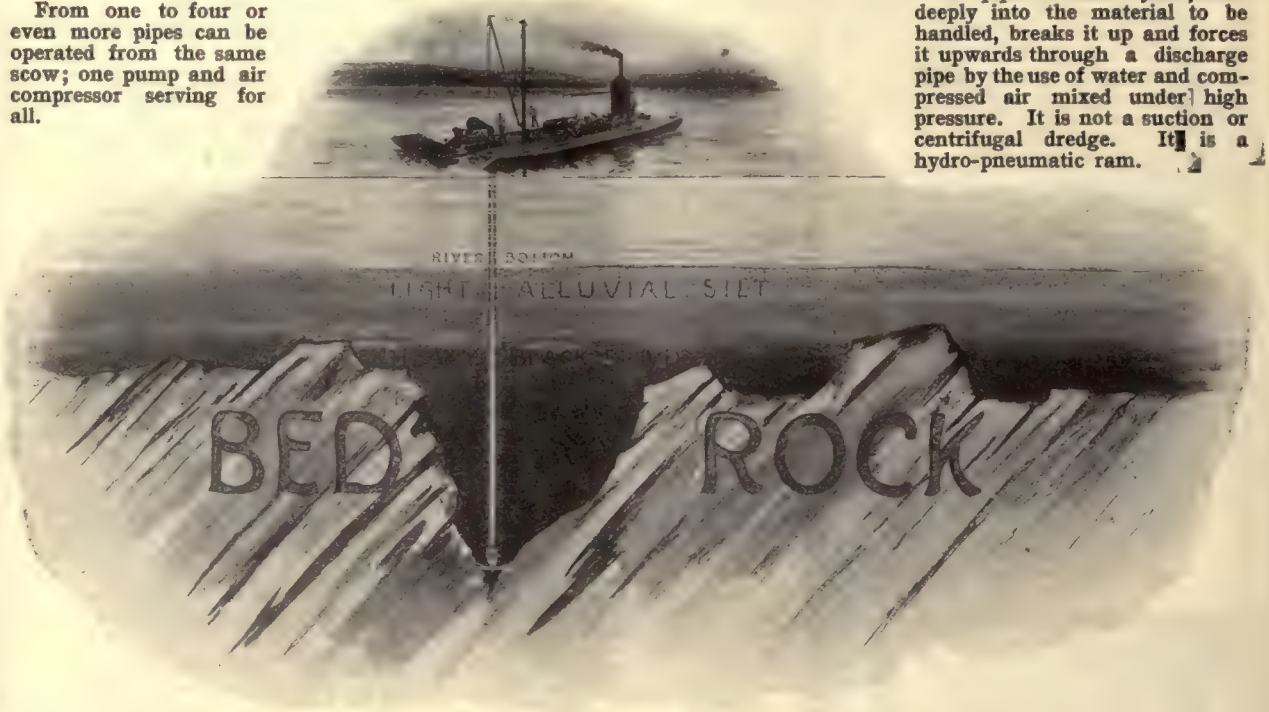
THE PNEUMATIC PIPE DREDGE

The Pneumatic Pipe Dredge is a new, inexpensive device for dredging sand, silt, muck and gravel, or any other material or soil susceptible to rapid disintegration by the action of water under pressure

From one to four or even more pipes can be operated from the same scow; one pump and air compressor serving for all.

Its pipe or head "jets" itself deeply into the material to be handled, breaks it up and forces it upwards through a discharge pipe by the use of water and compressed air mixed under high pressure. It is not a suction or centrifugal dredge. It is a hydro-pneumatic ram.



The Bed Rock Pneumatic or Compressed Air-Pipe Dredge.
This shows the pipe lifting the heavy black sand out of one of nature's bed rock riffles. The precious minerals like gold and platinum have been trapped in these pockets or riffles for untold ages, but no method to recover these stored up treasures had been devised before the advent of the pipe dredge. This dredge will enter these pockets and recover the values they contain.

ATTENTION ENGINEERS.

It is not possible to describe this dredge nor tell of its superiority in a few words. However, IF YOU HAVE USE FOR A DREDGER, it will pay you and save you money to look into the merits of this device. It will also save time. Here is part of what Mr. M. A. Nurse, for 18 years Chief Engineer of the State of California, says about the Pneumatic Pipe Dredge.

"Beyond question, the Pneumatic Dredge embraces the cheapest and best application and utilization of mechanical and natural agencies for excavation and transmission of sand, silt, or any material susceptible of rapid disintegration by the joint action of air and water under pressure, that I have ever known through an active experience of over thirty years in river improvement and reclamation. It is simple in principle, cheap in construction, efficient in operation and must on the score of economy and greater adaptability supersede other methods in the broadest field of river and harbor improvement essential to our State and National development."

HAVE YOU DREDGING TO DO?

If you require a dredge for reclamation work, for levee building, for recovering sand or gravel, for filling, for channel or harbor deepening, for mining or for lifting or moving any class of material excepting boulders, DON'T OVERLOOK THE PNEUMATIC PIPE DREDGE.

Pneumatic Pipe Dredge, Operating by Electricity, with Four Ten-Inch Discharge Pipes. Capacity over 15,000 Cubic Yards per day.

CHEAPEST AND BEST DREDGER IN THE WORLD.

The Pneumatic Pipe Dredge can be installed anywhere within a few weeks for a small fraction of the cost of other dredges and it requires only one-fifth the labor, one-fifth the power and one-twentieth the cost of maintenance of any other dredge with similar capacity. It handles from 40% to 60% solid matter all the time and dredges handling from 25 cubic yards per hour to 20,000 cubic yards per day can be built and installed for from $3,000 to $25,000. There is nothing to get out of order. Anyone with common sense can run it. It is "fool-proof." Don't you think

IT IS WORTH WHILE INVESTIGATING.

One of these dredges is operating in the heart of the City of Sacramento, California, on a contract for the city. Twice in succession this dredge has been awarded city contracts on competitive bids. Other contractors could not come within a mile of the price bid for the work. Yet the dredge is making money. It is practical results like this that talk.

For full particulars about the dredge and its installation on a royalty basis, address

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THE ECONOMY OF NORTHWESTERN IRON HEADGATES

Now is the time to clean out your reservoirs and ditches and get your headquarters ready for next season's irrigating. Before repairing that old wooden gate it will pay you to investigate the advantages and economy of Northwestern Iron Headgates. Many times during the irrigating season you spend money and valuable time repairing and replacing wooden gates, and next year you will have still more expense and trouble. As this is a continual expense, a wooden gate cannot be considered economical.

Wooden gates are certain to swell, warp, decay and break down. You know how hard and unhandy a wooden gate is to operate and regulate. The swelling and warping of the wood naturally makes the gate stick to the bottom and sides. Often in opening you pull or pry the gate out altogether, and lose time that may mean money to you, and water that is a direct money loss. You can avoid all this trouble by getting a Northwestern Iron Headgate. It can be easily and quickly operated and exactly regulated and cannot stick, because it is operated by a wheel and screw.

A wooden gate is seldom water-tight. The swelling and warping of the wood soon cause leaks. These leaks frequently result in break-downs and wash-outs, which generally occur just when you need the water to save a burning crop. If it is a ditch gate that goes out, the run of water for you in the ditch may be past by the time you have stopped the break. Water lost means crops lost, and crops lost means money lost. You cannot afford to take chances on leaks or wash-outs or gates of doubtful quality when you can get an absolutely water-tight and perfectly reliable iron headgate. It is worth something to you to know that your water supply is safe and that you can absolutely control and economically regulate it. Northwestern headgates, being made of iron, cannot swell or warp, and as all bearings are carefully planed and ground, the gate cannnot leak.

No matter how well a wooden gate is made, you know that in a few years parts of it, at least, will rot to pieces and need replacing,, if the entire gate does not need renewing. The money you have already spent on it, put with what is necessary now for repairs and what will be required next year, would amount to more than the cost of a Northwestern Iron Headgate, which would last a lifetime without any repairs whatever. Here is where the greatest economy of Northwestern Iron Headgates comes in, because one Northwestern Iron Headgate will outlast half a dozen wooden gates.

When you buy an iron headgate, price is not the only thing to consider. Your first question should be not how much will it cost, but what will it do and how much will it save. The cheapest gate is the one that lasts the longest. The first cost of a Northwestern Iron Headgate is its only cost, while to the first cost of a wooden gate you must add the expense of repairs year after year.

Remember that Northwestern Iron Headgates are made particularly for western irrigation reservoirs and ditches—made to answer all requirements of practical irrigators, and to overcome all the defects of wooden gates. Northwestern headgates, as-made today, are the results of years of careful study, experience and development.

Quality of materials, combined with careful workmanship and the most approved design are what make Northwestern headgates the most economical and satisfactory.

If you have any doubt about the advantages and saving of Northwestern Iron Headgates, it will pay you to get one, set it up and try it. The trial costs you nothing because if you are not convinced that the gate will really pay for itself in the time, trouble, water and repairs it will save you, simply ship the gate back at my expense. I will stand the freight both ways and pay you what it cost you to set up the gate. If I did not have a gate which I knew positively would do all I claim, and more, could I afford to do business in this way? I don't feel that I take chances, because my gate has never failed to prove my claims of satisfaction, value and economy.

Write today for catalogue showing many kinds of iron headgates, some one of which you will find is especially suited to your purpose.

C. D. BUTCHART, Denver, Colorado

Send $2.50 for The Irrigation

Age one year and

The Primer of Irrigation

Otto Suction Gas Producers
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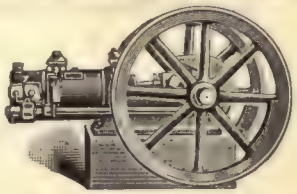
Are Reliable and Can Be Operated By Men of Ordinary Intelligence

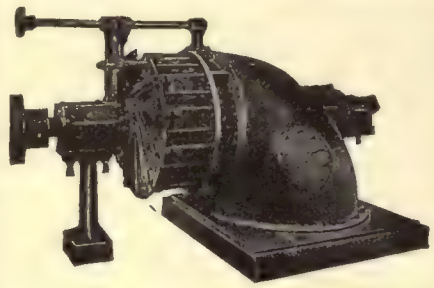


J. A. Witter, Engineer for the Beaver Crossing Electric Light & Power Co.. Beaver Crossing, Nebr., writes:

"Please send me a book of instructions on handling and running your gas producer and engine. I have been running this one on horse sense, but that might not work at all times. Plant works fine.

This man without special instructions, but with the use of "horse sense" causes his plant to work fine. There is a volume of praise for "OTTO" machinery in Mr. Witter's short letter.

The Otto Gas Engine Works
Philadelphia, Pa.



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When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the HIGH SPEED of the SAMSON, for a given power, lighter and consequently CHEAPER transmission machinery can be used.

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Denver is the logical irrigation center of the United States. You will find nearly everyone engaged in or interested in irrigation projects stopping at the Oxford Located half a block from the Union Depot: Fire Proof, Modern, European Plan and Popular Prices

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Our Savings Bank Clock

PAT. NO. 776058

Will teach you to save money, at least one coin a day, for you can not wind the clock until you insert a coin in the slot. It has an alarm attachment and runs 24 hours each time you wind it.

The coin you put in the slot unlocks the patented device which holds the winding mechanism closed until such coin is inserted. This device locks again automatically within a few hours, but the clock runs the full 24 hours and then you must put in another coin to wind it again.

The alarm attachment makes the clock useful and you will see by the illustration that it is very ornamental. You usually wind a clock when you set the alarm and with this clock you must put in a coin, nickel, dime or penny, before you can wind it.

It reminds you to save, and the bank part is large enough to hold over $80 in dimes. You are not limited to one coin a day, but can put in as many as you wish, but you must put in at least one coin or you can't wind your clock.

If you do not want to save for yourself, put aside something for your son, daughter, mother or father, Christmas or birthday presents, vacation, insurance premium, clothes, etc., or buy the clock for some one you want to teach to save. Surely you have some one like this.

Price, **$2.50** (U. S. postage stamps accepted).

Raffle one off among your friends and make some money for yourself.

For premium users, we will make the following low quantity rates:

10 clocks at $2.00...	$20.00	100 clocks at $1.50...	$150
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"SOLD—when You're SATISFIED"

That's the way Eckerle Pianos find homes for themselves.

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Complete 8-foot wheel and 30-foot tower, total weight 940 pounds. Price.....$37.40

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Complete 8-foot wheel with 40-foot tower, total weight 1130 pounds. Price.....$42.85

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Complete 10-foot wheel with 40-foot tower, total weight 1260 pounds. Price.....$51.05

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Complete 10-foot wheel with 50-foot tower, total weight 1600 pounds. Price.....$60.05

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NEW ALBAUGH-DOVER MODEL 5D-12 SEWING MACHINE

90 Days Trial

A $60.00 Machine From Factory to Home for

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MORE MONEY

From Your Cows and Much Less Work In Getting It.

If you could see the Real "DIFFERENCE" between the **NEW BUTTERFLY CREAM SEPARATOR** and any other made—**Difference** in amount of the cream you get; **Difference** in the quality of cream; **Difference** in the way the machine runs. **Difference** in the number of times a minute you have to turn the crank; **Difference** in the way the milk is aërated and purified while being separated; **Difference** in the time and trouble it takes to clean the skimming device—you would say, as hundreds of others are saying today—"I'll get the NEW BUTTERFLY CREAM SEPARATOR."

If you could see how to make easily $10 to $15 more a year on each and every cow you keep, and still do it with less work for your wife and yourself, you'd say: "I'll get a Cream Separator."

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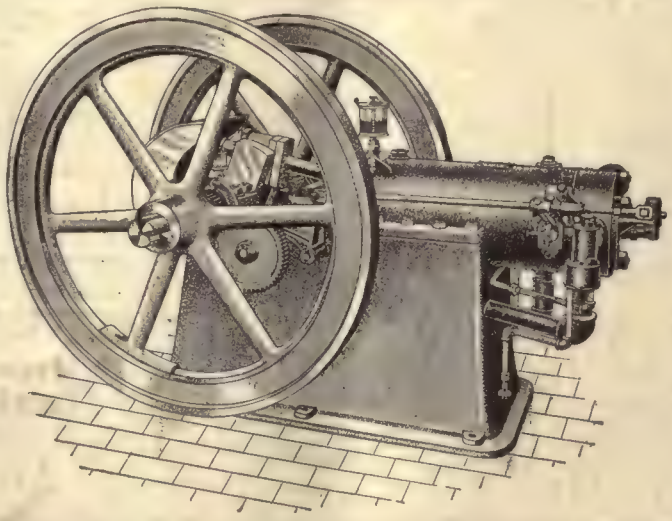

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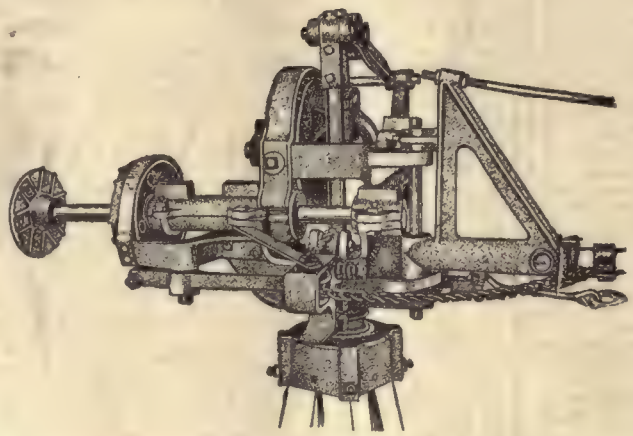

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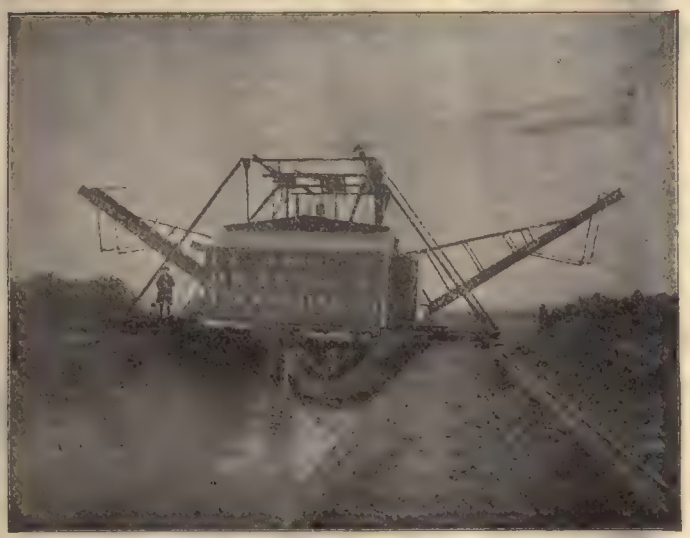
VOL. XXIV. CHICAGO. JANUARY. 1909. No. 3

TITLE REGISTERED U. S. PATENT OFFICE

A Ditch for Irrigation or Drainage



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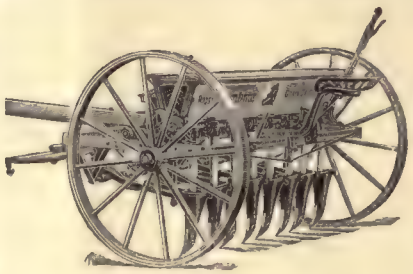

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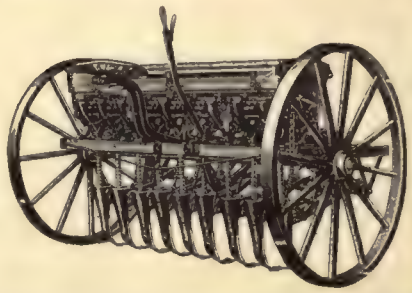

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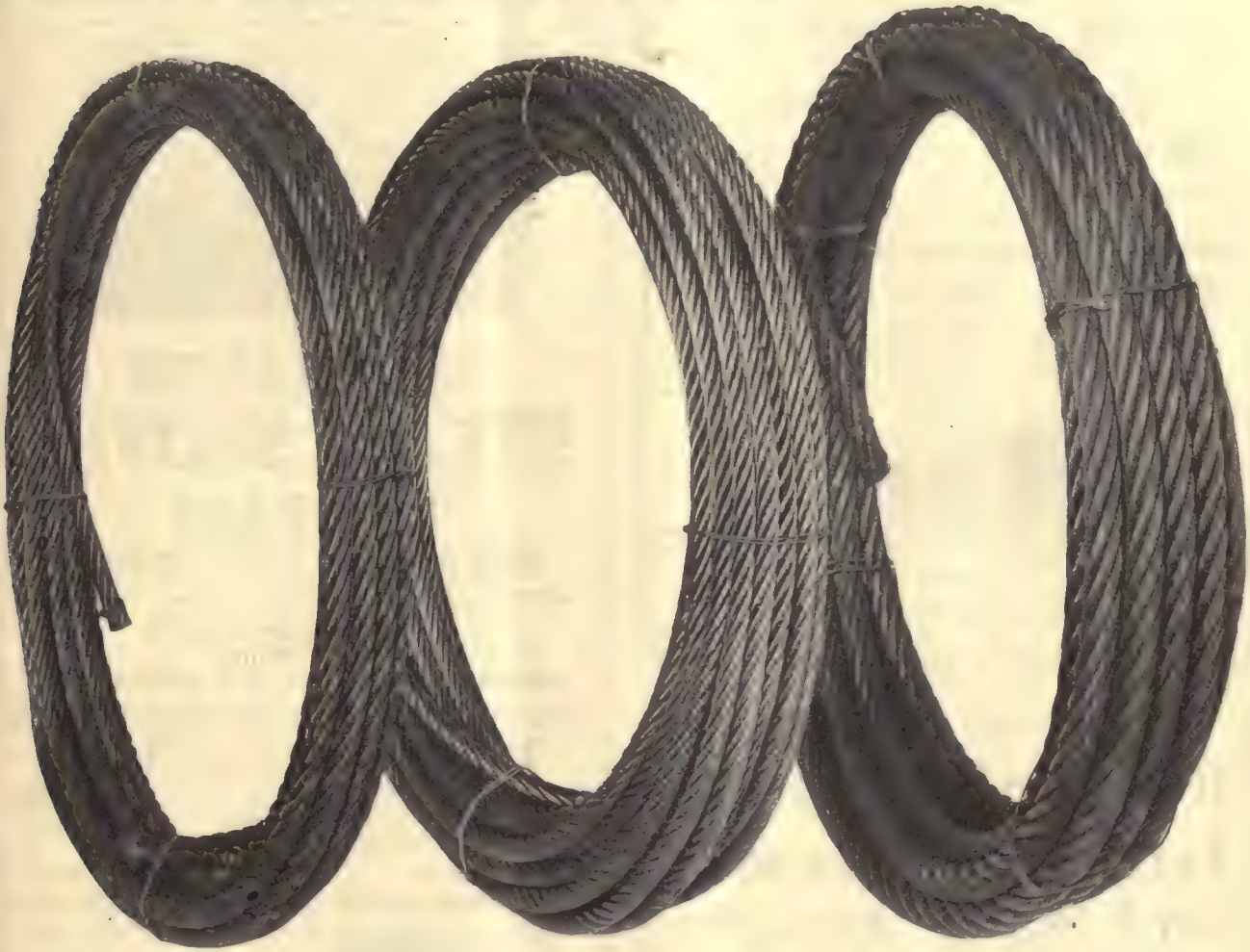

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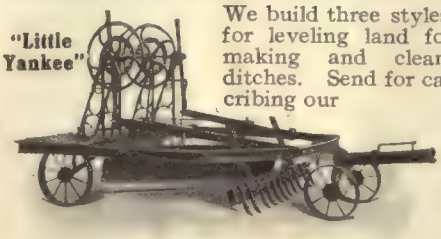

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THE IRRIGATION AGE

VOL. XXIV CHICAGO, JANUARY, 1909. NO. 3

THE IRRIGATION AGE
With which is Merged
MODERN IRRIGATION — THE DRAINAGE JOURNAL
THE IRRIGATION ERA — MID-WEST
ARID AMERICA — THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,
112 Dearborn Street, - - CHICAGO

Entered as second-class matter October 3, 1897, at the Postoffice at Chicago, Ill., under Act of March 3, 1879.

D. H. ANDERSON, Editor

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, $2.00. If ordered in connection with subscription, the price is $1.50.

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It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 24 years old and is the pioneer publication of its class in the world.

Irrigation Congress, Spokane, Wash., August 9-14, 1909.

We are in receipt of word from Mr. Arthur Hooker, secretary of the Board of Control of the Seventeenth National Irrigation Congress, which is to be held in Spokane, Washington, in which he calls our attention to the fact that August 9th to 14th has been set as the date for the National Irrigation Congress in that city.

Mr. Hooker states that this date has been selected as most convenient for those desiring to visit the Yellowstone National Park and Alaska-Yukon-Pacific Exposition at Seattle in connection with the Irrigation Congress.

In view of the early date at which this congress is to be held, the special congress number of THE IRRIGATION AGE will probably be in April instead of May, as originally contemplated. We expect to publish a 120-page magazine on that date, for general distribution throughout the central and western states with a view to inducing manufacturers and others to visit Spokane and the Irrigation Congress on the date named.

Owing to the fact that Spokane is so well supplied with first class hotels there will be no difficulty in entertaining any number who may decide to visit the city at that time. It is safe to say that Spokane has a larger number of first-class hotels than any city of its size in the central or western States.

Our readers should begin to make plans now for the western trip in August. This is a good season of the year to visit the irrigated sections, and it is also a very desirable time to visit such points as the Yellowstone Park and Seattle, with its great exposition.

Any information which may be desired concerning the congress or other attractions in the west during the month of August, will be gladly furnished by THE IRRIGATION AGE.

Should Resign.

We have recently received several communications concerning the matter of W. A. Beard, who is acting as chairman of the Board of Governors of the National Irrigation Congress, and who has recently been appointed on the Farm Life Commission by the President. It seems to be the sentiment of those who have written us on the subject that Mr. Beard should not retain his position as chairman of the Board of Governors of the National Irrigation Congress while holding a federal position. If this is the general sentiment, he should resign in favor of some outsider who would doubtless be equally as efficient.

Power Irrigation.

We are presenting in this issue the first of a series of articles on Power Irrigation by Mr. E. C. Reybold, Jr., of Denver, Colorado. Mr. Reybold is a recognized authority on this subject and will contribute twelve articles to be run during the year 1909. THE IRRIGATION AGE is pleased to secure the services of a man so thoroughly competent to handle this subject.

Any questions which may arise in the minds of our readers on the subject of Power Irrigation may be forwarded to this office, and replies will be published regularly at the diction of Mr. Reybold.

Eastern Assistance Needed.

The editorial suggested by a conversation with Mr. C. H. Robertson, of Wyoming, which appeared in our issue of December, concerning the attitude of the west against Gifford Pinchot and the Forestry policy is indicative of a strong sentiment against him and shows that, politically, he may change by this policy, the entire conditions in the west.

The people of the East cannot understand the feeling which exists in the West against this domineering, arrogant policy of the Forestry Service. They only get one side of it and that is the side which is furnished through the Government Press Bureau conducted by the Forestry Division which furnishes information regularly to the daily newspapers of the country. It should be borne in mind that the people of the West heartily sympathize with Eastern people when it is brought to their knowledge that a wrong is attempted against them by Congress or government officials. It may be said safely that Western people are no more quick to resent conditions of an oppressive character than are the people of the East. Why, then, should not the Eastern people investigate and learn the cause of this universal protest which comes out of the West? All that the Western people request is that Easterners investigate carefully and be not too precipitous in forming opinions based upon information furnished by the Forestry Bureau.

The Eastern people have no direct means of studying the attitude of western people and the conditions under which they are trying to build homes and this is due to the fact that no organization has as yet been perfected to combat the misrepresentations boldly put forth in forestry bureau bulletins and through Pinchot's Press Bureau.

Would Withdraw From Entry.

In his annual report for the last fiscal year, Commissioner Fred Dennett of the General Land Office, recommends the withdrawal from entry of all public lands which may be irrigated that are not now capable of being utilized for homes. On that point he says:

"The proper step to take would be to classify the lands of the United States in order to ascertain what public lands, which in their present condition, are incapable of affording a home, are susceptible of irrigation at a cost even much greater than that now entertained by the Reclamation Service, and to withdraw these lands from entry, awaiting the time when they can, by irrigation, be made homes, either by the United States Government or under the Carey Act."

To one who has studied the moves of the General Land Office during the past ten or fifteen years, a suggestion or recommendation concerning withdrawal from entry of any of the public domain, is scrutinized somewhat carefully, and the suggestion by Mr. Dennett that no one can be hurt by such a withdrawal owing to the fact that desert lands which cannot be reclaimed by the individual efforts of settlers can never become a home until water is brought to it by the government, state, or by the expenditure of vast sums by private enterprises, tends to mislead. In the first place Mr. Dennett must certainly know that no private corporation would attempt to develop or expend money in the survey to demonstrate water quantities and the feasibility of reservoir sites on land which had been withdrawn by the General Land Office.

It looks very much to us as if there were "A nigger in the fence" in this suggestion, and it would be well for those interested to investigate the matter carefully and learn the exact intention of the proposed withdrawal. This should be looked after by the various western representatives in Washington in the interest of the prospective colonists and corporations who contemplate development under the Carey Act. In other words, the suggestion of Mr. Dennett should be thoroughly gone over by competent men in Congress before definite action is taken.

Irrigation Law.

In a recent discussion of irrigation law problems, a prominent Western judge and lawyer expressed himself in terms that indicate that the water users must soon be afforded that protection which is guaranteed by some public authority in nearly every profession of business. While not recalling his exact words, the sentiment of his address was as follows:

"Our government has been slow to accept fundamental principles. It is unnecessary for me to enter into a detailed discussion, to prove this to be the case. It must be remembered that Congress has spent many days and years in the discussion of land laws and principles embodied by them. The wisest and best of men have given their entire time to this subject; yet we find that, although our land laws are of the best, injustice and fraud have not been entirely avoided. No one can read our land laws and then say without qualification that those responsible for them have not shown great ability and foresight.

"Lands originally belong to the Nation at large. States and individuals obtain patent to them by and through acts of Congress. Another important resource is water. Under the national constitution the general government is to retain the management of streams

that are navigable. The Supreme Court has decided that the States are responsible for the control and distribution of waters that are not navigable. It would be presumed that where irrigation is essential, where prosperity of the farmer depends upon an actual diversion and use of water, where the doctrine of riparian rights cannot prevail, except in theory, the State would be active in formulating and putting into effect such laws as would protect the water user as has the government in the protection of the homesteader.

"When we review legislation along this line, we find that the States have but partially realized and accepted this responsibility. Unfortunately California was the first State to furnish an example of the need of local regulations. The public failed to recognize that water is naturally public property. Those who used water and needed protection in that use could only go to the court. It was natural that the courts should recognize principles which are applied in humid sections of the United States. This brought about the application of the doctrine of riparian rights in an irrigated country! Never before in the history of the world was an attempt made to apply a principle more unsuited to conditions and to the needs of those who were using the waters of the streams.

"Colorado followed California, and the water users have expended more in litigation than in the construction of irrigation works. They have overcome the obstacles placed in their way by Nature, only to be engulfed in more serious troubles for which man can alone be held responsible.

"The newer States have done better. The law makers there have realized that the questions which should rightly establish a right to use water and on which that right should be based are simple. The duty of the public is therefore to establish that kind of administrative machinery which will be able to ascertain the facts. When these are found and assembled the relative rights automatically fix themselves and it only takes a declaration by some public authority to place a proper determination into practice.

"Wyoming must be given the credit for bringing the first relief to the water user. Her example would have been initiated by many other States had events followed in natural sequence. After the passage of the Reclamation Act by Congress, the Reclamation Service took an active interest in State legislation relating to the use and distribution of water. The recommendations of that branch of the government service were finally crystallized into a code which sets forth plainly the desire of this branch of the government service to control the States in this particular. Not only does this code provide for special favors to the Reclamation Service, but it places the appointment of the State Engineer in the hands of the director of the Geological Survey. The code was prepared by an officer who never had charge of an irrigation administration and whose sole purpose seems to have been to prevent the States adopting laws which might reflect credit on men who have been recognized for many years as experts in this kind of work.

"The Reclamation Service code is judged to be a failure. Those who have tried it in practice not only admit this, but they are willing to go out of their way to demonstrate it. This code lays a foundation for obtaining the necessary facts for a determination of rights, but it does not bring a prompt settlement of disputes relating to the use of water, neither does it prescribe the proper machinery for carrying any determination into effect.

"The settlement of water right controversies should not in the first instance go to the court. Our courts are already over-burdened with work. Irrigation and the problems it involves are of a scientific nature. Some kind of a competent authority should have charge of an administration which would devote its entire time and ability to the many details of this important work. If a question of law arises in connection with this administrative work, an appeal always lies and the courts can then accept the duty that comes to them with facts and evidence complete.

"It is to be hoped that reform in this direction will not be delayed another period of five or ten years by an opposition that is based on bureaucratic politics or through prejudice against those whose advice must finally be accepted."

Oppressive Use of Power.

A western publication recently devoted a page and a half to an article written by Gifford Pinchot, Chief of the Forestry Bureau, which might easily deceive its readers into the belief that there was no valid base for the opposition which has been raised by the needless and unjust regulations which have been established under his direction.

That these objections to the rules of the Forest Service are not groundless THE IRRIGATION AGE has reason to know, having on hand several sworn statements by miners and others, showing where they have been deliberately misused by officers of the Forest Service, usually rangers.

The methods employed to repress and thwart the development of the Owens River Valley is well illustrated by a statement from a gentleman in that valley who says: "A number of gentlemen lately came from the Northern part of California to secure land for homes in the vicinity of Independence. They had traveled a long distance at considerable expense, and had left their business interests until they could secure a new loca-

tion, when they expected to make application for land and return to adjust their affairs preparatory to making that country their home. On reaching Independence they sought for land which officers did all in their power to secure for them. They found first that a great body of desirable agricultural land had been withdrawn under specific instructions for the city of Los Angeles, something like 20,000 acres, in a territory tributary to Independence and upwards of 50,000 acres within a range of fifty miles had been so withdrawn that it could not be entered under the homestead act which permits homesteads within the National Forests. After several days of careful investigation they found some good land and made their selections. When they came to file they found, to their amazement that the local office could not accept their entries but that the regulations or rules of the Forestry Bureau (not laws passed by Congress), required that they submit their application direct to the Forester at Washington; that neither the land office in Independence nor the forest office at Bishop kept any record of these applications and that it would be necessary to make application to the Forester, and that if approved by him they were then referred back to the local officials of that department for a report, and if finally approved were then turned over to the Interior Department, and after another wait of 90 days for advertising the list, the land would be open to entry.

In view of the fact that it takes from three to six months to get an entry approved and of record in any of the reserves, the methods employed in that particular locality made the Homestead Act practically nugatory.

These men could not wait, as they were not permitted to go on the land, and not being sure that their applications would be approved, and as there was no means of ascertaining whether one or a dozen applications for this same tract had already been filed prior to theirs, they became discouraged, and left the country.

We are informed that it is almost impossible to get any definite knowledge without this long wait, and in any event the prospective settler would find it necessary to make a second trip.

Thus are homeseekers hedged about by rules laid down by the Forestry Bureau, which have not been sanctioned by Congress.

To an uninterested spectator the impression arrived at is that there is something wrong in a law which prevents men from building homes in desert areas where water could be secured to reclaim them.

If Mr. Pinchot is at fault his work should be closely investigated.

As another illustration of how men who are working to develop the western country are handicapped by the rules and regulations of this department we are producing herewith a copy of an affidavit signed by S. F. Stoughton of Colorado. This tells a story in itself and needs no comments by us.

DENVER, COLO., September 26, 1908.

In June, 1907, I bought a half interest in a saw mill proposition, on Snake River, Summit county, Colorado. Our firm employed from 10 to 15 men and were unable to get the range rider, Mr. Bunker, to scale the logs which we had cut from the timber purchase, when we called on him to do it, he claiming that he did not have the time to attend to it. After waiting about two weeks for him to scale these logs, we began to look into the matter of his being so busy, and discovered that in the meantime Bunker had made several trips to Montezuma, which took him right by our mill, on personal matters, which did not require his presence there in the capacity of range rider; in fact, we discovered that his principal business in Montezuma was to advise our customers to whom we had sold and delivered considerable lumber, that they had better not pay us for the lumber, as the saw mill did not belong to us, and if they paid us for the lumber that they would have to pay for it again to the Lenawee Tunnel Transportation & Development Company. The result of Mr. Bunker's advice to these parties was that they refused to pay us for the lumber already delivered to them and until the matter was understood by our customers we could not deliver them any more lumber on our contracts, which covered the delivery of several thousand feet more. We shut down the mill, and put our men at work, in order to keep the crew together, at a great loss to the firm. We then met the supervisor from Leadville, at Dillon, and advised him that we had been obliged to close down the mill, on account of the action of Range Rider Bunker, and after going over the matter with the supervisor, he agreed to have Mr. Bunker go to our customers in Montezuma and apologize to them and to us for his action in the matter, whereupon we told him that that would not reimburse us for the loss of our trade, and that we preferred to keep the mill closed down rather than start up again under Bunker's administration. He then said he would have Bunker removed and send us another ranger, which he did later, but I understand that Bunker was soon after that promoted to a better position, with more pay.

Mr. Bunker's action made it impossible for us to collect for the lumber which we had sold and delivered at Montezuma, and we had considerable difficulty in meeting our pay roll. As soon after this as possible we closed down the business and the mill has been idle ever since.

S. F. STOUGHTON.

COUNTY OF DENVER, } ss.
STATE OF COLORADO, }

Personally appeared before me S. F. STOUGHTON, and upon his oath declares that the above facts herein set forth are true to his own knowledge and belief.

Given under my hand and the Notary Seal, this 26th day of September, 1908. THOMAS CONNELLY,
(Signed) Notary.

Dated September 26th, 1908.
My commission expires June 9th, 1909.

THE IRRIGATION AGE is in possession of other affidavits and data concerning the oppressive use of power by Forestry officials and these will be given publicity from time to time in future issues of this journal.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

Modify Rules Under Undeveloped Reclamation Projects.

One of the most serious complaints coming from the irrigation districts arises from the holding from year to year indefinitely, under contemplated projects, vast bodies of land, no provision being made for new private irrigation plants. Notwithstanding section 3 of the Act of June 17, 1902, provides that: "Said surveys shall be prosecuted diligently to completion," and "if determined to be impracticable or unadvisable" the Secretary of the interior "shall thereupon restore said lands to entry," the decision upon the practicability, largely we believe because of the lack of adequate funds, is year after year left an open question.

Vast bodies are being held withdrawn from entry under the Desert Act, and placed under such regulations governing homestead entries, as to practically disbar settlement. Several such nebulous projects have been held three, four and five years, with no immediate prospect of construction. There is an urgent need for a reasonable modification of the rules, and an unquestioned need of greater funds for the service. A gentleman whom we recently met, in speaking of districts where these rules were particularly obstructive in the development of that section, has stated the case as follows:

"All of the lands under these various reclamation projects are held subject to the future establishment of the works, whether it be accomplished in one or more years, and every tract so withdrawn must eventually pay its full pro rata of the cost of construction. These projects may not be undertaken for several years. The two mentioned have been held for three and five years respectively, not a stroke of work having yet been done and no possibility of anything being done for possibly another five years. The utter inadequacy of the funds at the disposal of the service makes it practically certain nothing can be done in that time.

"A very large portion of these withdrawn areas for reclamation are also held under forest withdrawals, the settler thus being subjected to the requirements of three different departments. *He cannot live upon and cultivate the land without water.* Within six months he must begin residence and cultivation. If he fails, an agent from one of three departments reports his entry for cancellation. He must therefore either immediately establish a pumping plant, the feasibility of which he cannot decide without a large outlay of money and much time; or he must dig a ditch for several miles at a cost of from $1,000 to possibly ten times that amount.

"Often, and as is usually the case, he is not financially able to do this alone, but must combine with others in the construction of the ditch or pumping plant. The conditions surrounding the land selected, together with restrictive rules of the different deparments, make it difficult if not impossible to induce other settlers to apply at the same time for lands in that vicinity. The result almost invariably is that he will not file an application.

"If he finally constructs his plant by the expenditure of several thousand dollars in time or money, he does so with the full knowledge that *when the proposed reclamation project is established, he will be required to purchase water from the government works at from probably $25 to $30 per acre, abandoning his plant and all it has cost for construction. It is a total loss.*

"During all of this interval of from 3 to 10 years he has lived in an isolated situation, perhaps miles from the nearest neighbor, probably with no schools or churches, hampered by poor roads in a sparsely settled country. If he by chance located within the Forest Reserve, his cattle, sheep and horses cannot run at large, as has been the privilege of the settlers from the earliest times. He must pay the annual charges of that service; must herd his stock to prevent their straying, or he must fence his own land. To secure posts he must drive 25 to 30 miles over rough mountainous roads, climbing steep grades to an altitude of 9,000 or 10,000 feet to reach the timber. (It will be noted there are no trees on these *forest reserves.*) His trip requires a man with four or six horses for from three to five days to secure a load. The forest service are now charging him 8 cents apiece for every post he secures under these adverse conditions, where it is impossible to obtain them from any other source at a less price than the cost thus forced upon him of from 25 to 30 cents.

"These are actual conditions, and the results are shown by the records, viz.: That while there have been hundreds and thousands of inquiries from homeseekers, a great number having gone over the lands stated they were highly pleased with the locations; the great majority have refused to make application, however, under the conditions imposed. Here in a country with a rich and fertile soil, and with a delightful climate, where every inducement ought to be extended by the government to the homeseeker, scarcely a score of entries have been made and perfected since the Reclamation and Forest withdrawals were extended over these agricultural lands.

"Before such withdrawals these sections were being rapidly turned into beautiful homes and thriving towns, upward of 350,000 acres of land having been patented during the past twenty to thirty years. This region might easily support a population of many thousands. But what citizen would now seek to secure a home in this desert country under the conditions imposed. The results speak for themselves. I have asked this question of at least a hundred men, not one of whom has answered in the affirmative. You wouldn't, nor would I.

"While the provisions of the Act of June 17, 1902,

are difficult to administer over so vast a territory, with the utterly inadequate means at the disposal of the Reclamation Service, still the terms of the act are sufficiently explicit to show there never was an intention on the part of Congress that vast bodies of tillable land should be withheld from entry for a long series of years, nor that they should be placed under such restrictive rules as to practically prevent their settlement.

"There is no just reason why these rules and regulations, and if need be, the Act itself, should not be so amended as to permit the unrestricted development of all lands suitable for settlement as fast as applied for. A year's investigation ought to enable the department to determine whether or not a project is feasible, and no restrictions should be placed upon settlement more than a year prior to construction. Some allowance should be made to the settler who, in the interim, is forced to construct a private irrigation system, to enable him to comply with the law."

The pioneer upon the desert has proven through the hard and oft-time unremunerative school of experience what can be raised upon these lands. His life is a strenuous battle for a home upon lands which our fathers taught us was a wilderness. No one knows what this means save those who endured the years of privation, and a life-time of hardships, which would satisfy even our most strenuous President. A large part of the reward for his labor comes to him now by reason of the rapid settlement and development of the country. His lands, which were scarcely worth the payment of taxes, become rich and valuable.

The early settler who braves the hardships of pioneer life, who proves the soil and climate, showing what crops are adapted to the country, thereby paving the way for more effective service by the government's reclamation, is surely entitled to all he gets.

And there is no just reason why whole communities, and whole counties should be thus handicapped and their development retarded through a long series of years by such needless extension of these blanket withdrawals over every acre suitable for settlement.

Will pay for the

$2.50 IRRIGATION AGE one year and the

PRIMER OF IRRIGATION

EDITORIAL NOTES.

BY G. L. SHUMWAY.

J. H. Edmiston is in jail. He was once state oil inspector and a politician of importance and character. He combed the hair of the grafters the wrong way. Subsidized and guilty publishers made much of his arrest and conviction.

They in some occult manner had before his indictment hinted at a man "high in the political world" on whom the federal sleuths had tangible evidence of frauds. In fact, the public mind was poisoned in the usual way now employed by prosecutors of the government and the mysterious unknown person was convicted before the public knew whom it was or what were his crimes.

One of the principal witnesses of the government, it is now stated, is a man who is under indictment for almost every crime except murder, and on the testimony of such as these, good men are sent to jail.

At the time of Mr. Edmiston's indictment others were involved, among which was W. R. Keefer. Some time previously Mr. Keefer had filed upon a claim over which roamed the herds of Mr. Edmiston. He never settled upon the land and never pretended to. On the contrary, failing health and a change of opinion caused him to migrate to the Pacific coast, where he died and was sleeping the long sleep in that far off mould long before the sleuths of the land department charged his name with crime.

Dean Ware has also served his term for being guilty of the crime which for forty years were not considered crimes. It was at the time of his conviction that Dean George A. Beecher, of Trinity Cathedral, Omaha, asked to be permitted to serve the sentence.

Dean Beecher probably exemplifies the life of the lowly Nazarine as nearly as any living man. He is of the West, with a heart pulsating with human sympathy and a brain capable of understanding and appreciating the character and trials of western empire builders.

To illustrate his life work, he is the sponsor of dozens of refractory boys who have been paroled from Judge Sutton's juvenile court at his request. They report regularly to him and he is thus building up in them the latent principle of honor and making better Americans for the future.

Prisons are becoming respectable while real criminals are being granted immunity for destroying character and trying to break the strong spirit of the West and humiliate and bedraggle the names of honorable men. Recently Attorney General Bonaparte congratulated the administration upon the work it had accomplished in the way of convictions for land frauds. It simply shows the ignorance, of conditions, that prevails in administrative circles at Washington.

President Roosevelt has disclaimed the distinction of being much of a constructive statesman, but he avers that he "is a torchbearer throwing on the light." Truly the programme he has followed in his attitude toward the West is one of setting alive the fires of hate, of kindling distrust, dissention, disorder, in a thousand ways.

The spirit of Americanism has become timid instead of bold, and fearless toilers for Western enterprise have met with almost constant rebuke and humiliation for daring to assume that they know and presuming to advise, albeit theirs is the experience. While the reward of incompetent sycophants is constant advancement in the face of their more capable associates.

Two years ago Mr. Beard, chairman of the executive committee of the Irrigation Congress, succeeded in converting powers which were delegated to him into giving ninety per cent of the time of the session at Sacramento to the exploitation of government ideas and less than ten per cent to the critics. His reward is a membership of Mr. Roosevelt's farm life uplift commission, notwithstanding his general lack of knowledge of farm life and the fact that the President had no legal authority to create such a commission.

This commission now wisely advises for postal savings banks as one of the essentials for improving farm conditions. It will probably approve of anything else, political or otherwise, that the President suggests, even to favoring some dire punishment for such fearless editors as Pulitzer, Lewis, Ridder, Watterson.

And he from California, where they grow no corn, came to the National Corn Show and told the farmers how to select seed corn. With all the assurance of their class, they confide to us ignorant denisons of the soil, the very things our fathers taught us years ago and have been drilling into us for generations.

Every step corn has taken from the parent teosinta to its present splendid perfection, has been made by selection of seed. My father told me the points some thirty odd years ago, yet these farm life experts confirm it all by assuring as fact that which decades of practice and proof has only made a mere suspicion.

But it is in keeping with the wisdom exuding from several popular branches of our government. The knowledge elucidated in the useful book of the forestry department that twenty-seven and a half prairie dogs will eat the grass from an acre of Texas soil, goes far towards solving the problem of how to meet a panic.

And, yes, erosion, let us not forget the direful effects of erosion. What matters it that the richest soil of many of our agricultural states is the result of erosion. It took several billions of years to wash out dirt enough to make Mississippi and Louisiana. What do we care? They only produce niggers and Democrats.

Unfortunately for the theories of the government experts, most of this erosion occurred long before deforestation began. The same is true of nearly all the fertile valleys that are now being reclaimed by irrigation in the trans-Missouri region. The dirt taken from the rugged mountains eight or ten thousand feet above the sea and carried to lower altitudes and deposited by irrigation canals or otherwise where it will serve mankind by yielding harvests is a splendid thing. What good is the dirt up there? While down here it fertizizes and enriches our farms. Will it injure the mountains by making them more rugged? It will improve our agriculture by leveling up our farms.

THE BUCKEYE GAS ENGINE.

The Buckeye four-stroke cycle gas engine built by the Buckeye Engine Company of Salem, Ohio, a concern which has been building steam engines for upwards of sixty years, and who have recently taken up the manufacturing of gas engines, is shown by illustrations in these columns.

The word "cycle" means a succession of events occurring repeatedly in regular sequence, and when used in relation to heat engines means purely a succession of events in any single combustion chamber of such an engine, and has no reference to the number of cylinders or whether the engine is single or double acting.

The term "four cycle" is more properly a four-stroke cycle. This engine is being introduced throughout the West where pumping is necessary for irrigation. It is said to be one of the best engines in point of construction on the market.

The illustrations in the advertisement which is carried in this issue in connection with the two illustrations in our reading columns will give a comprehensive idea of its style and appearance.

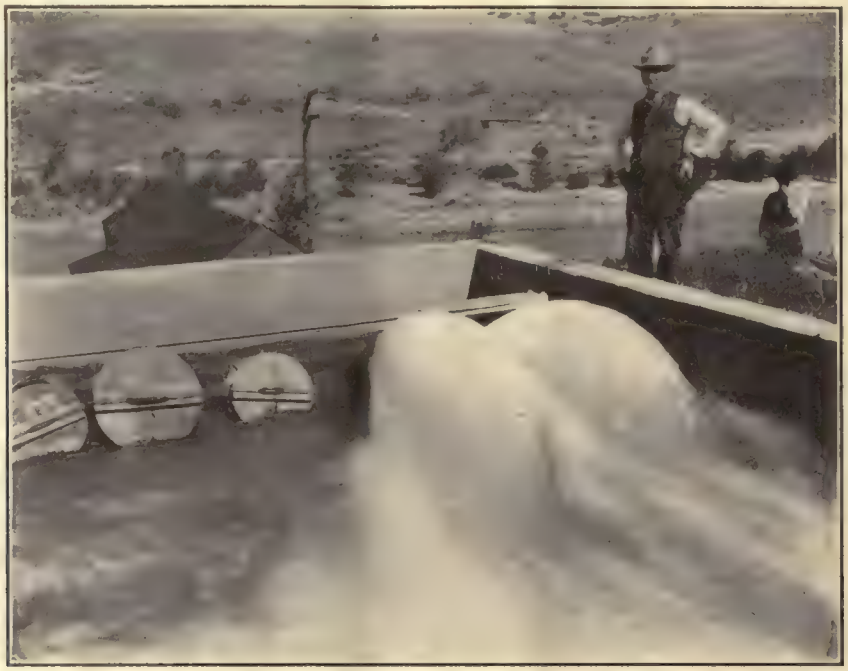
Those who contemplate pumping for irrigation would do well to write to the Buckeye Engine Company, Salem, Ohio, and they will, no doubt, receive some very fine illustrated matter concerning this machine.

POWER IRRIGATION

By E. C. Reybold, Jr.

The demand for irrigated lands has become so great during the past few years that more attention is being devoted to the use of power to pump water upon lands that could not otherwise be irrigated. For centuries irrigation ditches have been taken out of rivers and streams in order to cover land that would not grow crops without additional water, and thousands of acres have been thus brought to a high state of cultivation in all parts of the world. The ruins of the aquaducts of the Romans and the ditches of the Incas of Peru, now filled with earth since their destruction by the Spanish three centuries ago, attest to the age of such works. As time went on it was found that in certain seasons there would be insufficient water for all of the lands under such ditches, and reservoirs were constructed to conserve the heavy flow of water that ran to waste during flood periods of the spring and summer, at which time the ditches would not carry all of it; and also to store the water that hitherto was permitted to run to waste during the fall and winter months when the irrigating ditches were closed. The water thus stored has served to add a tremendous acreage to that which could be irrigated by gravity ditches, and the development of reservoir propositions is going ahead rapidly in all parts of the country.

But a third step in irrigation was necessary in order to supply the increased demand for irrigated lands. Good land is not always so placed that water can be brought to it by means of a gravity ditch, as the land must always lie at a lower level than the source of the water to be so served. It is here that power irrigation finds it field, and during the last few years many plants have been installed to lift water from a ditch stream or lake to land lying above it, or to pump to the surface the underflow or so-called "sheet water" that underlies large tracts of land frequently but a few feet below the surface. For many years the underflow has been pumped in California with eminent success, some wells being as deep as 200 feet, and operate upon similar lines, using a number of centrifugal pumps, each of which draws water from several cased wells sunk to tap the underflow. Each pump is operated by a motor, and as the pumps are quite a distance apart, a centrally located power plant is used to generate electricity for all. The Reclamation Service uses steam turbines to drive their generators, while the sugar company is installing producer gas engines, crude oil to be used in the producers. The total cost of the Reclamation Service project was $355,000, or a little less than $35 per acre, which is to be repaid to the United States in ten equal



The Discharge of Two of the Five Pumps at the Palisade Irrigation District, Capacity of Each 10,000 Gallons Per Minute.

in Colorado and adjoining states similar work is making great progress. At Garden City, Kansas, the Reclamation Service has in operation a very large plant, pumping to the surface sheet water lying about 25 to 30 feet below, and the United States Sugar & Land Company is now installing a similar plant at the same place. The Reclamation Service plant supplies water to 10,656 acres, while the present plant of the sugar company is for about one-half as much, their plans calling for installing pumps for about 5,000 acres additional for the season of 1910. Both plants

Four-stroke Cycle Single Acting Buckeye Gas Pumping Engine.

Four-stroke Cycle Double Acting Buckeye Gas Pumping Engine.

annual installments without interest. The costs of operating are shared by the land served and aggregate about $2.75 per acre per year. Since the cost of the plant may be likened to the cost of a water right from a ditch or reservoir system, it will be seen that this cost of installation is not at all high, as many water rights cost $60 or more per acre. At Palisade, Colo., power irrigation has attained large proportions, practically all of the valuable fruit land in that section being irrigated by water pumped from the Grand River. The Palisade irrigation district has 6,000 acres under its ditch, portions of which have been sold for as much as $4,000 per acre. It is evident that such high prices could not be obtained if the pumping plant were not as substantial as, and did not furnish water with the regularity of, any gravity ditch or reservoir system. This plant has a total capacity of about 50,000 gallons per minute, or over 4,000 inches, divided into five units with a total of about 1,000 horsepower. Its neighbor, the Mesa County Irrigation District, irrigated 2,600 acres with a pumping plant of about 700 horsepower in two units. Both of these plants use water power to drive the pumps, utilizing a fall of 14 feet that is secured by power canals leading out of the Grand River.

The Redlands Irrigation & Power Company installed an excellent pumping plant near Grand Junction in 1907, taking water from the Gunnison River near its mouth in order to supply both their wheels and pumps. This plant was designed to irrigate 5,500 acres lying 132 feet above Electricity is therefore assisting in the production of the famous "Greely Spud."

Gasolene engines have been used for years for comparatively small acreages and low lifts, and have proven a boon to the farmer in need of power that costs but little when running, and nothing when idle.

At Green River, Utah, steam engines driving centrifugal pumps are being used at three plants of considerable size. The Elgin Power & Water Company has a 100 horsepower engine and a 12-inch pump. The water is lifted 51 feet above the Green River and distributed to 800 acres of fruit land. A considerable portion of this land was set to peaches in 1907, and it now presents a magnificent appearance. The Little Valley Land Company has a 135 horsepower engine and two 10-inch centrifugal pumps for 750 acres of fruit land, and the Green River Mutual Irrigation Company a 100 horsepower engine and a 12-inch pump to supplement their water power plant for 1,200 acres. The frosts of the spring of 1908 did but little damage to the trees of Green River, and the inhabitants feel much elated over their prospects. Some 500 acres of land in this section have been irrigated by a gravity ditch for many years, and excellent fruit produced, but it was not until the fall of 1906 when the subject of power irrigation was broached that anyone believed additional land could be watered. Nearly 3,000 acres have already been added to the original 500, and several thousand acres more are available.

A Farm Scene in the North Platte Valley. Farm Recently Sold to an Iowa Farmer for $20,000.

and a crop of over 24,000 bushels gathered from 125 acres. head water in the power canal. The wheels operate under 35 feet head, at which each will give about 700 horsepower. Legal complications have hampered this company considerably, and it has not yet attained the success that it deserves.

To the north of Denver electric power is supplied by the Northern Colorado Power Company to all cities and towns within a reasonable distance of one another, their lines running beyond Ft. Collins and Greeley. In the recent extension of the bond isue of this company, it contemplated reaching out for a pumping load as large as could be obtained, rates to be made so reasonable that motor-operated pumps could be used in many places where it was previously thought power could not be used. Since an irrigation pumping load is heaviest during the time that the demand for power for lighting is lightest, the company is able to make very reasonable rates for such service. The extension of the power lines of the Central Colorado Power Company is also looked upon with favor by irrigatin farmers, as cheap power is what they are all looking for. Motor-operated dumps may be run constantly without further attention than oiling once or twice in twenty-four hours, and the item of cost of labor to operate such pumps is thus almost entirely eliminated. The eminent success of the three motor-operated pumps installed by Mr. A. J. Eaton, near Eaton, Colo., attest to the value of such installations. Land lying 23 feet above an irrigating ditch and never before irrigated, was planted to potatoes and a crop of over 24,000 bushels gathered from 125 acres.

It is our intention in the future to set aside space in Irrigation Age to power irrigation in order that we may keep our readers posted relative to the methods used in various sections of the country to "put water where it won't run." From time to time we will give detailed descriptions of plants with costs of installing, maintenance and operating. Several of the plants mentioned in the article under this head in this number will be described fully, with illustrations. We will also have a number of articles of intense interest to all in which comparisons will be made between the cost of supplying water by gravity systems, and by pumping with steam, electricity, gasolene producer gas and water power, with the field in which each should be used. There will also be an article in which it will be shown that in certain cases it would actually be more economical to install a pumping plant than a reservoir and gravity ditch system when the latter will cost as much as $50 to $60 per acre. This may seem improbable at first, but is a fact, as will be brought out clearly in the article to appear shortly.

Another article will discuss "The Relation of Producer Gas Engines to Irrigation," showing how irrigation farmers as well as all other users of power, are being actually benefitted by the annual increase in the cost of coal, which has made necessary the perfecting of the producer gas engine which uses only one-fifth as much fuel per horsepower per hour as a steam engine.

We want to make this department of value to our readers, and will see that all letters and inquiries are referred to competent engineers for reply.

GERMAN LUTHERAN COLONY.

At Keystone, in the North Platte Valley, Nebraska.

We are presenting in this issue a number of fine illustrations of the North Platte Valley near Keystone, Nebraska.

Until within the last few years the great fertility of this valley remained unknown. The early settlers on their way westward chose the south fork of the Platte River and very little was learned about the territory adjacent to the north fork of that stream.

recently through the Payne Investment Company of that city.

The Keystone German Lutheran Colony is a result of a decision by a number of people, of that denomination, to locate in some good rich spot in the West and the selection of the territory around Keystone followed a report of an investigating committee of disinterested German citizens who visited the land late in September, 1908. The committee consisted of ministers, expert farmers and well-known Germans of Nebraska, and each of them enthusiastically endorsed the proposed colony.

Paxton Home Place at Keystone, Site of the German Colony.

The discovery of the great fertility of the land led the Union Pacific Railway Company to build a line through it, and thus it has been opened up to settlement.

Keystone is in the heart of the valley. It has an altitude of about 3,200 feet. The soil is rich, black, sandy loam, which grows splendid crops of hay near the stream, and is adapted to all kinds of general farming back on the higher ground. This soil is known as quick soil and is particularly well adapted to irrigation.

To any one who intends to change his home in the future or go on a farm, this project is worthy of investigation.

The Payne Investment Company of Omaha is willing to take interested people out to this land from Omaha, so that they can satisfy themselves personally. The terms made by this company are liberal and therefore favorable to people with small capital. To the working man who has labored for years for others and who has never come into possession of a home of his

Irrigating Ditch on the Keystone German Colony Land.

The uplands farther from the stream, while not suited for tillage present fine opportunities for the grazing of herds.

The Keystone German Lutheran Colony lands have been rapidly taken up by people owing to the fact that they have been sold on exceptionally easy terms. This whole tract was originally owned by W. A. Paxton, Jr., of Omaha, who has placed it on the market

own there is no better opportunity than is offered in this vicinity.

The numerous illustrations in this issue with the legends accompanying same will give a very fair idea of this section of the country. This opportunity should be particularly attractive to people of German birth who are desirous of locating in a community where their mother language is spoken.

The Art of Irrigation

Chapter Eight

By T. S. Van Dyke

Assuming that you have the ground laid out just right, the subsoil wet enough, and the ground planted with fruit trees well cultivated, everything now looks quite fine. And it probably is far better than it could be under any rainfall. But it is not as good as it should be. You cannot see it, for your eye is not practiced like that of a buyer of fruit on the trees. Even he may not know what the matter is, though he may quickly see that the fruit is deficient in flavor, keeping qualities, perhaps, and in the percentage of the first grade, which is the first thing he looks after. Perhaps only an experienced grower from some of the most successful fruit growing districts could tell you and he could not do it at a glance. Probably he would not offer any criticism unless pressed for an opinion, when he would probably say:

Cattle in the North Platte Valley. Note the Groves in the Distance.

"Well, down our way we get better fruit and more of it by irrigating with furrows than we can by flooding."

"How so?" you ask. "Flooding puts in water enough, doesn't it?"

"Oh, yes, but we quit it long ago and are making more money out of less water."

"But it doesn't interfere with good cultivation," you suggest.

"Well, no, I suppose not. But there's some difference we can't account for exactly, something besides keeping the water away from the trunk of the tree. But we do know the difference in the cash box. We thought we were doing well enough before we changed. But it is certain that we are doing much better. You might not be able to point out the difference when in the orchards, but there is no appeal from the returns."

Such talk as this has within twenty years changed the irrigation of whole sections in the west and I do not know of a single case in which there has been a return to the old method, or that any one has any fault to find with the new; though there are many places where a very porous soil would disappoint one who could not get large enough heads of water.

On tight soils, it may be used with very small heads.

Suppose you have a square ten acres in orchard. It will be two hundred and twenty yards on each side and you want to put into the soil an equivalent of three inches (rain measure). As a second foot equals an inch an hour per acre (rain measure), it will need thirty hours to make three rain inches on the whole. This would be far too slow for flooding, even in twenty-five foot checks. But if you can get a second foot for thirty hours you can do better work with small furrows with less help, and if you can get it sixty hours you can do still better on many soils with only half that head, or half a foot.

It may seem quite absurd to divide such a stream into two hundred and twenty little ribbons of water, running only a little over a gallon a minute and spread a yard apart and expect them to get anywhere. Yet that is exactly what is done in many a fine orchard and to do it all you need is patience, and to remember that it is the greatest step in advance that was ever taken in horticulture, and one that has been so thoroughly tested for thirty years that it will never go backward.

You naturally remark that your soil will never hold up such a little stream to run two hundred and twenty yards across the ten acres. That is exactly where you may deceive yourself. It probably will if you give it time enough. Suppose you try it. Make a small furrow about three inches deep with the corner of a hoe, turn in such a stream and sit down and watch it. Or better yet, go down town, or go to bed. If it will cross the ten acres in ten hours with the land well graded to a uniform slope, with the furrow evenly made, and no gopher hole to engulph it, it is all you should expect. If it will do it in fifteen it is fine, and if it takes twenty-four it is good enough, provided you can have the stream one or two days longer.

The results of such work if well done are those of a long, slow rain and are superior for almost anything to any form of flooding. This is especially the case in orchards where the cutting of one check to rush its contents into the next one has the effect of a heavy dashing shower. And even the finest flooding that can

be done in lands for all kinds of garden work is not equal to a long, fine rain. Flooding for economy or to close the air spaces at the surface is quite another matter, just as much as flooding to drown gophers. On land where you do not have to seal the surface the difference is plain if you watch it long enough.

But there are some soils where the water will drop too straight downward and not soak sidewise far enough and others where the soaking is provokingly uneven. On one place I had, corn would get plenty of water two feet from the furrow, in a few hills farther on it would wilt at the same distance, and in some places the ground would be dry six inches from the furrow. The ground was rich and easily worked when wet and merely seemed to have tight spots through it. This ground raised fine fruit with any form of irrigation, but was a nuisance for gardening because for that you don't want streams running two or three days. Half a day should be enough with shorter furrows and sometimes larger streams. And if corn, potatoes and similar stuff will not flourish under a three hours run of streams of about nine gallons a minute—one fiftieth of a second foot—the land will probably be better for something else unless you have plenty of water to waste.

moisture will show at the surface all the way between the furrows. This may dry an inch or two during the day if the sun is bright, as it usually is, but if it is cloudy it will probably remain moist all day.

You should test these questions, but not be discouraged if you fail to wet the whole surface, or if you cannot raise the moisture nearer to the surface than one foot between the furrows three feet apart. It may prove that the soil is better adapted for trees or vines than for vegetables, or that the furrows should be closer together, or that it is better for some trees than for others. With alfalfa it would make no difference and the same probably with any deep-rooted plant. But where the soil is too open, and increasing the size of the streams has no effect in spreading water to the sides, then flooding is the only way left.

When you return to look at your little streams you may find some broken out into the next ones, or several have made a big puddle from a slight swell of land running crossways and quite invisible to the eye. If the streams carry any rubbish it will be apt to collect wherever they reach ground even half an inch higher than their beds. The formation of a little dam is then quite certain, followed by the breaking out of the stream

Plowing Up Sugar Beets in the North Platte Valley. This Crop Produces From $75 to $100 Per Acre Per Annum.

Even then it don't follow that it should be all used because you have it. If cold, it may be very bad, for garden stuff generally needs water oftener than orchards and chilling the ground too often may cause more loss of profit.

The main difficulty with water dropping downward in some soils instead of soaking sideways is in too even texture, like shot of one size. In very gravelly and sandy soil it will soak to the sides perfectly if there is enough fine sand and fine clay or dust mixed with it. This is the case with most all upland soils. With furrows three feet apart the moisture will meet two feet below in half a day and in a day will meet at six inches below on some soils. In winter it will often be visible at the surface, but in hot weather especially with a strong sun in dry air it will rarely show at the surface even at daylight. On my ranch I can wet to the center with furrows five feet apart, so that it will raise a good stand of grain provided it once sprouts. In winter it will sprout the grain without showing moisture at the surface if the weather is clear and dry. But when the sun is very low in midwinter and the nights cold the

from the backwater or the formation of a pond by several streams uniting. To avaid this even greater care should be used in grading than for flooding, for now you have no levees to force the water on certain lines. The grading is generally cheaper, for there is very little carrying to be done. Instead of scraping off top soil too much you must make more faces, each with its own distribution system. Most all the grading can be done with a drag provided it is very long, stiff and heavy with good scraping edges. One edge may do but the drag must be long and stiff or it is worthless for taking down the low swells that interfere with even flow of the streams. Cutting these deeper with the plow, hoe or furrower will not always remedy the trouble. Being deeper they will collect more leaves or rubbish when there is any wind; and, as these furrows are broken up after every irrigation, the next ones may not be in the same places the others were and a variation of but a few inches may compel deeper cutting again. The trouble is that if one stream fails to go through with the rest you may not have the water long enough to send it through afterward and

if you crowd on more water it may disarrange all your other streams. In any event, it is such a nuisance that it will pay you to insure a uniform flow of every furrow by careful grading at the start.

For the same reason all weeds, dead grass, sticks and other rubbish should be removed from the ground as far as is consistent with reasonable economy. The harrow and hay rake used often enough will do it. You must bear in mind the difference between raising a few things for home use and raising them on a large scale for market. Thus a patch of blackberries at the end of a field to take the waste water may be a great success for your table, no matter how badly irrigated so long as they have water enough. But to run a large patch for market that way would often mean light profit and possibly none. You cannot always see these things at once or believe that such trifles can count. But the years tell a different tale to a grower who keeps close account of every cent as many do. It may seem silly to talk of combing the ground free of trash and worry over an inch of rise in a furrow. But when you see the work done by a long fine thread of water so fine that the camera can give no idea of it with the best light you can pick, and see two hundred or more of these winding over a ten-acre tract while the owner is snoring serenely in the hammock, you will conclude that you can take considerable trouble at the start to secure such ease and certainty of results later on.

I am sorry that I cannot get satisfactory pictures of fine irrigation. All that I have ever been able to take myself and all I have seen by others are abominable. A picture of checks shows nothing of value if full of vegetation. If bare, then an inch or two of water in the best-made checks with a man on the levee between them at a hundred feet from the camera will remind one of the old hymn:

"Lo, on a narrow neck of land
Twixt two unbounded seas I stand."

One who has never seen the real thing quite naturally thinks it needs a whole river to irrigate a decent farm.

Photographs of furrow irrigation are still worse. Everything in the way of a picture must be taken so that the average city Jake not only can but must comprehend it at a glance. If a picture were taken showing the thin ribbons of water as they actually run the aforesaid Jake, who nowadays is more ignorant than the "country Jake" of a few years ago, would think it a mere picture of an orchard, for very little of the water would show. To reach the profundity of his cranium, the picture must show plenty of light on the water, and this requires a rush of it. Consequently every attempt to show furrow irrigation is taken from the worst specimens, cutting and tearing the ground in all directions, eddying here and building bars there, washing out the feeding ditch at the head of the furrow, and making puddles everywhere. Most men of sense, who had never seen good work done, would naturally say—"If this is irrigation, I will take rain."

PAYETTE AND THE PAYETTE VALLEY, IDAHO.

The Home of the Jonothan Apple—One of the Garden Spots of the Northwest.

BY J. A. HARADER.

Did you ever take a run out to the Pacific Coast over the Union Pacific and the Oregon Short Line Railroads?

TWO OF THE PARTY TAKE A BOAT RIDE.
There Are Several Nice Lakes for Boating and Fishing on the Site of Keystone Colony, Fed by Spring Streams From the Hills.

If you have not, you have yet to experience the greatest contrast and intermingling of dreary, desolate and unwelcome desert with the brightest, richest and most beautiful valleys that our whole country offers. If you have made this trip, you will perhaps remember of passing through a pretty little city, out in Idaho, on the main line of the Oregon Short Line Railway called Payette, situated at the junction of the picturesque Payette River and the silent Snake. If you did not stop off at this point, you perhaps little dreamed of the beautiful valley lying up the Payette River, nestled securely among the low foot hills of the Rockies, with this sparkling mountain stream coursing through its center and giving, through a vast system of irrigating ditches, abundant, luxurious life to everything within its borders, while far out and beyond stretched the expansive desert of sage brush and monotony and gloom.

It is here that irrigation is king, every home a castle and every tiller of the soil a prince. It is to this valley that industrious and enterprising people from the East and Middle West are coming to settle down and live amidst

Nature's richest resources, by whose means to build for themselves beautiful and comfortable homes, and to enjoy independence and acquire wealth beneath the sunny skies of one of Idaho's garden spots.

It would be necessary for you to see to be able to believe and to appreciate the splendid opportunities and the wonderful resources of this valley. It would be necessary for you to see with your own eyes the enormous yields of different products, the fruits, the vegetables, the hay, the grains, taken from one acre of this fertile ground, in order for you to comprehend their meaning; and after you had

Corn in the North Platte Valley.

spent some days under the influence of the delightful climate of the place, you would then begin to realize the benefits of Nature's great gift of sunshine and pure air.

The home of the Jonothan apple means as well a home of contentment and prosperity. In the Payette Valley the terms seem to be synonomous; for nowhere in the world are better or more delicious Jonothans grown than here,

INSPECTING THE IRRIGATION SYSTEM, KEYSTONE COLONY.

Birdwood Creek Furnishes an Abundant Water Supply to Insure Successful Crops—There Are Also Several Other Fine Spring Streams.

nor better prices commanded for perfect products, nor greater yields attained. It is a valley yet in its infancy, with plenty of room for more good people, a valley that offers all that can be asked by intelligent and industrious people.

When you go West, tell the ticket man at the window that you want a ticket or a stopover for that little city out in Idaho, on the Short Line, called Payette.

Supreme Court Decisions

Irrigation Cases

CONSTITUTIONALITY OF IRRIGATION ACT—

The act of 1887, for the distribution of irrigation waters (Laws 1887, p. 295), is constitutional. *McLean, Water Commissioner* v. *Farmers' Highline Canal & Reservoir Company.* Supreme Court of Colorado. 98 Pacific 16.

WATER RIGHT IS REAL ESTATE—

The right to the use of water for irrigation is real estate, and the proper method of conveying title thereto is by deed. *Rates* v. *Hall.* Supreme Court of Colorado. 98 Pacific 3.

INJUNCTION AGAINST FLOODING—

Including the land of another in a reservoir basin and flooding the same constitutes a permanent obstruction to its use by the owner, which entitles him to an injunction. *United States* v. *Rickey Land & Cattle Co.* Circuit Court, California. 164 Federal 496.

MISTAKE IN SURVEY OF PUBLIC LAND—

Until the government elects to correct mistakes in an

original survey of public land and asserts a claim to the lands by virtue of such mistakes, no one can complain or dispute the title of the holders of a prima facie title. *Little* v. *Williams.* Supreme Court of Arkansas. 113 Southwestern 340.

PAROL PROOF OF TITLE—

Since many of the earlier water rights, acquired by appropriation, and not by grant, have not passed by deed from the original appropriators, parol proof of possession and use of a water right is prima facie evidence of title. *Bates* v. *Hall.* Supreme Court of Colorado. 98 Pacific 3.

DAMAGES FOR DESTRUCTION OF CROP—

Where a lessor by breach of his covenant to furnish water for irrigation caused the destruction of the lessees' growing crop to the extent of rendering it worthless, the measure of damages was the value of the crop at the closest market, at maturity, less the cost of labor and attention that would have been necessary to raise and market it there. In estimating the damages, evidence of the value of matured crops of the like kind planted in the same neighborhood was com-

COMMITTEE INSPECTING TRAINLOAD OF BEETS.

Authorities Declare Keystone Land the Best in the West for Beets—These Were Raised a Few Miles Lower Down the Valley.

petent. *Smith* v. *Hicks.* Supreme Court of New Mexico. 98 Pacific 138.

APPROVAL OF DITCH ROUTE BY SECRETARY OF INTERIOR—

Under Act March 3, 1891, c. 561, Secs. 18, 19, 26 Stat. 1095 (U. S. Comp. St. 1901, pp. 1570, 1571), granting right of way for irrigating canals, ditches, and reservoirs over the public lands to irrigation companies, upon the filing of a map thereof and its approval by the Secretary of the Interior, such approval is essential, and where it was refused as to a reservoir because the site had been previously withdrawn from sale or entry and reserved by the United States, the company acquired no right or easement by the filing of its maps. *United States* v. *Rickey Land & Cattle Co.* Circuit Court, California. 164 Federal 496.

ACTION TO PROTECT WATER RIGHTS—

It will be presumed that a superintendent of irrigation of a water division through the water commissioners under his control distributes the water according to the priority of appropriation, as expressly enjoined by 1 Mills' Ann. St. Sec. 2448, and hence, in an action to enjoin the superintendent and commissioners from closing plaintiffs' headgates and from interfering with plaintiffs' taking water from a ditch, a complaint which alleged that defendants cut off plaintiffs' supply and ran the water past their headgates for the use of ditches in another district, does not state a cause of action, since the presumption is that plaintiffs' headgates were closed so as to supply senior priorities further down the stream, as directed by law. *McLean, Water Commissioner,* v. *Farmers' Highline Canal & Reservoir Company.* Supreme Court of Colorado. 98 Pacific 16.

DETERMINATION OF PRIORITIES.—

A suit to ascertain, determine, and decree the extent and priority of a water right and appropriation partakes of the nature of an action to quiet title to real estate. The courts of Idaho, in ascertaining, decreeing, and protecting property rights in water appropriations within the jurisdiction of this state, may at the same time and for that purpose inquire into and determine rights and priorities on the same stream that are located and situated higher up the stream and beyond the state line, in order to fairly and finally judicially determine the relative rights of the parties and decree the extent of title and right of possession of the subject-matter located and situated within this state.—*Taylor* v. *Hulett.* Supreme Court of Idaho. 97 Pacific 37.

Send $2.50 for The Irrigation Age one year and The Primer of Irrigation

BLUEWATER VALLEY
NEW MEXICO

BY OLANDER.

Farmers in the Bluewater Valley are busy plowing and building fences and getting their land in shape for cultivation this year. The lime kilns are now in operation and give employment to those who desire more work than their farms require.

Celery and onions, in addition to the forage crops, will be largely planted and good results are expected, as the New Mexico celery is especially crisp and tender. Mr. Walker, who will plant several acres of celery, is one of the best celery culturists in New Mexico, and other settlers are planning to profit by his experience. The navy bean will also be planted on quite an acreage.

The Bluewater Development Company is also about to establish a model forty-acre farm tract under the supervision of a man of long experience in vegetable farming, and who, in the last seven years, has produced results almost unbelievable in the way of profits. His method is the one which always brings the profits—that it pays to raise only the best.

The Bluewater Development Company has been furnishing all the water necessary for stock and the settlers always find the company willing to accommodate them in any way possible. As fine a bunch of range cattle runs at large through the free grazing lands in the valley as can be seen anywhere.

The weather has been delightful, crisp and clear nights and warm, sunshiny days. The mountains surrounding the valley are covered with a heavy fall of snow, and the outside grazing lands are in the best possible condition. When the snows on the watershed melt in the spring the water, after filling the immense main reservoir in the Zunis, will be stored in the many small basins which lie in the lava beds. These small ponds thus formed are of great value to the settlers who own stock in the valley, as the water in them lasts all summer, and the cattle graze on the nearby hills and find their way at will to the water ponds in the valley.

If the toiler back east only knew what joy there is to one living in a perfect climate, the clear, crisp ozone filling one's lungs and nostrils, making every breath a positive delight; and that a small bunch of cattle, increasing in weight every minute, almost without expense, would make more money than the average man's salary at the end of the year, far less congestion would exist "back east" today.

Another advantage in Bluewater is the system of water distribution. It is so easy just to request the company, by 'phone, for water when needed, and then find it ready for use in your ditches at once; just the same as buying water from a city water works. And such water! no alkali, just clear, crystal mountin snow water. Bluewater reservoir is at the junction of two mountain streams near the headwaters, so the water has no chance to gather harmful minerals during a long passage through an arid alkaline country, as is often the case in other locations.

One of the needs of the valley is large horses and mules. In fact, the breeding of horses and mules for farming and government purposes will prove a lucrative business in the future. There are few large horses in New Mexico, and all sections of the country want them.

Christmas was duly celebrated by all and the new year dawns on a happy and prosperous community—just one more instance of the miracles of irrigation.

These Hogs Were Raised on Alfalfa and Fattened on Corn, Near Keystone, in the North Platte Valley.

GARDEN CITY KANSAS and VICINITY

BY R. H. FAXON.

The complete regeneration of the Arkansas Valley, of which Garden City is the capital, was largely accomplished when the sugar beet factory came to town, and the United States Government established the reclamation project under the reclamation act of 1902.

It will be my purpose to treat in a future writing of the reclamation project, which is an institution of which the entire valley and particularly Garden City is immensely and naturally proud. The main discussion in this present writing has to do with the beet sugar factory, and what has since happened, following its establishment.

Though there is a string of beet sugar factories in the Colorado-Arkansas Valley, the one at Garden City was the first to be built in Kansas, demonstrating by two successful years the wisdom of the men who went behind it, and of Garden City in encouraging it and reaching out after it. That beets can be successfully cultivated has been made apparent to anyone, and the systems of irrigation, including the government project and the sugar company's own system, with the numerous private systems and the big new electrical plant the sugar company is now engaged in building for use next season, have swept aside every obstacle to the growth of the beets. As to the rest, the sugar content is constantly increasing, and the richness of the beet in the Garden City territory this past season is above that of the season before. That this condition will keep up—yearly progress and improvement—and grow with more care and intensified farming, is certain.

The name of the beet company is the United States Land & Irrigation Company. It is composed largely of Colorado men. Its principal holders, well known in the Kansas-Colorado-Arizona field are R. P. Davie and J. R. McKinnie, of Colorado Springs. This company has large holdings in Finney and Kearny Counties, Kansas, and Mr. Davie and Mr. McKinnie are largely interested in other factories and kindred ventures in Colorado and Arizona.

The Garden City beet factory was completed and opened for its first season in 1907. It is six stories in height, and important changes and additions have been made in the past year. The 1907 crop was something more than 7,000 acres, and that for the past season something less. The reason for this was the delay in the completion of the Garden City reclamation project and the fact that it was an unusually dry season with little water coming down the river. Private plants and later the government project, however, furnished water in abundance the latter part of the season and the beets raised were of a splendid character, full of sugar content, and the grade of tests higher than ever known in this valley.

To furnish material for the factory, the beet sugar people are dividing their holdings, 33,000 acres, into 80-acre tracts. On each side is built a house, barn and windmill. The tenants have good terms, and the company agrees to furnish all the labor for weeding the beets at $20 per acre, if the tenant does not wish to do it himself. Mexicans and Japanese do this character of work. The tenants themselves are about equally divided between Americans and foreigners of the German-Russian type, largely Mennonites, though there are some Catholics and a few of the orthodox Greek church profession. As a rule, these foreigners are good citizens, thrifty, and are an addition to the citizenship of this section not at all undesirable.

When the United States Sugar & Land Company entered the valley and decided to locate at Garden City, it bought, as stated above, 33,000 acres of land. Much of this lay in Kearny County just west of Garden City, though a very large proportion of it is in Finney County, running west from Garden City, and all tributary to this town. The factory is located just one mile west of Main street in Garden City, on the main line of the Atchison, Topeka & Santa Fe Railroad, and is the pride of the town. Modern to the extent of no other factory in the country, its care and maintenance are given the most scrupulous attention. The superintendent, E. E. Brysselbout, a Frenchman, who is most skilled in practical management of a big institution of this character, a chemist and a man of wide experience in Europe before coming here, gives attention to the most minute details. The general manager of the company, F. A. Gillespie, is a skilled executive, formerly from Colorado, and the affairs of the company, both as to factory and land, are a marvel of success. The dumps, of cement construction, as is much of the building, are perfect, and of easy access from the near-by fields and the several roads leading to the factory. The equipment of the factory and appurtenant apparatus is of the very finest, and systematized to the highest degree.

Immigration, due to the great development of this section and especially to the successful beet-raising and the big new factory, is very marked at the present time. Thousands of homeseekers are wending their way in this direction each year. Not long ago one land man at Garden City brought in a special train, consisting of three Pullman cars, filled with men from Illinois and Iowa who wanted land. These men had sold, or are about to sell, their good land in those states at prices that are so high they felt it would not be fair to sell, and consequently are looking about for land at lesser price on which to establish their homes. Land that was worth $10 to $20 per acre two years ago is now selling for $50, $75 and $100. Lands under the ditches can be cultivated for $30 per acre, and they raise 20 or 25 tons per acre. At the ranging price of beets per ton, $5, the figuring is easy and the result attractive.

The statement has recently been made by a careful writer who has the habit of closely investigating his facts, that twenty years ago New England and New York capitalists lost half a million dollars trying to irrigate the Arkansas Valley in Western Kansas. This was before the "boom," and before the days of now when intelligence, education, science and caution are the ruling and predominant factors in cultivation. They dug, in this 20-year-ago period, about 200 miles of irrigation ditches. They thought they could irrigate 200,000 acres of land. Then Colorado began to grow Rockyford cantaloupes and such stuff, water refused to come down the river, speculation stood still, then values went down, and things tumbled generally. The ditches were dry, the land cheap and largely uncultivated, and the valley discouraged and nonprogressive. Yet all the time there was the spirit of the indomitable West and the desire and insistence on the part of a small body of men that things would get better again—must get better; and they stayed with the job and began to use their heads about their work. It was an uphill struggle, but it finally panned out all right, as witness the results of today.

Twenty months ago came the rebuilding. The beet sugar company bought 33,000 acres of the rich valley land at $15 an acre. It undertook a new system of irrigation—the utilization of the "underflow." The Arkansas River breaks through the mountains above Pueblo, and is a tumbling, noisy, narrow flood as it passes the foothills. Then it spreads to a wide, slow stream, and finally, as the eastern border of Colorado is reached, the river bed, a quarter-mile wide, is, during much of the summer, drifting sand.

But the water exists. It is flowing toward the sea, seeping its way 10 to 20 feet below the surface through a vast sand deposit. From this subterranean stream, the "underflow" is being pumped the water for irrigating the sugar beets. Square cement buildings stand at intervals over the fields. Within, day and night, week in and week out, work gasoline engines, each running from four to six pumps which, combined, send 10-inch streams out upon the thirsty land. Then a great natural reservoir on the uplands has been constructed at a cost of $100,000. It is over a mile wide and eight miles long, and in places 50 feet deep. During the spring the water will be bank-full, and the reservoir will become a lake. The water will be utilized next summer when the beet crop needs it.

There was a time when the builders of this great empire that centers at Garden City counted very much on the suit brought by the state of Kansas against the

state of Colorado to compel the latter to forego the generous and lavish use of the waters of the Arkansas River in order that Kansas might get its supply. Kansas claimed that Colorado had injured the farms of the lower valley by using so much water that the river bed was left dry in summer after crossing the state line. Colorado replied that, as the river rose in that state, its people might do as they pleased with the water. Its reply was boastful and defiant. The government intervened in the case, claiming that the Reclamation Service alone should have the right to distribute the water of interstate rivers.

The case dragged along in federal courts for seven years. Then it went to the United States Supreme Court. The record in the case comprised 10,000 pages—the most voluminous ever filed—and at an expense to the states of Kansas and Colorado of more than $100,000. Nearly everyone is familiar with the result. Colorado won; but something fixed and certain in the way of a principle, a discussion of interstate waterrights, came out of the decision, and here is the paragraph. It is well worth reading and rereading:

"To the great body of the valley it has worked little, if any, detriment, and regarding the interests of both states and the right of each to receive benefits through irrigation and in any other manner from the waters of this stream, we are not satisfied that Kansas has made out a case entitling it to a decree. At the same time it is obvious that if the depletion of the waters of the river by Colorado continues to increase there will come a time when Kansas may justly say that there is no longer an equitable division of benefits and may rightly call for relief against the action of Colorado, its corporations and citizens, in appropriating the waters of the Arkansas for irrgation purposes."

Not through the aid, then, of a decision of the Supreme Court of the United States has the subsequent development gone on, but rather in spite of such decision; and the work is being done today in the Kansas-Arkansas Valley in western Kansas, in the territory tributary to Garden City, is marked to the utmost. In previous pieces in these columns, and in the figures and facts presented earlier in this writing, something has been shown of the work done—all of it, mind you, dating from the time of the decision, a quotation from which appears just above. And this work of development has been so marked, so wonderful, that a recent writer in Leslie's Weekly has this to say, every word of which is true, important and worthy of careful thought:

"During the past summer excursions of landseekers continued; an Associated Press daily has been started at Garden City, the metropolis of the sugar beet country, and the farmers are looking forward to the time when land shall sell, as does that of the upper valley in Colorado, at $300 to $500 per acre.

"The transformation comes out of the present conditions, and no court decision is needed to make the progress permanent. The pumping stations are lifting the underflow as windmills were never able to do; denatured alcohol is counted on—and it can be made from the refuse of melons and beets—to add to the possibilities of cheap power for the pumping plants. Steam plows, turning over thirty acres by day, and then, with headlights pointing the way, turning over thirty acres more by night, will be busy during the autumn and early winter breaking the short-grass sod. The rainfall seems to be increasing. Reservoirs are conserving it, and also the surplus water of the streams, when there is abundance. The towns are growing, the farms are occupied, new roofs are common, the prosperity of the people is very real. The valley has more than recovered the business activity of two decades ago, and with this difference—now the farmers are practically out of debt, they understand climatic conditions, they are operating with intelligent comprehension of what can be done and how to do it.

"To its first beet sugar factory, said to be the finest in this country. Kansas expects to add at least four more, making ten along the 'American Nile' in the two states, extending sugar beet land from La Junta in the Colorado foothills to Dodge City, well down toward central Kansas. It is the most tremendous regeneration now going on in the Middle West."

CORRESPONDENCE

BUCKEYE, ARIZONA, December 3, 1908.

IRRIGATION AGE, *Chicago.*

DEAR SIRS—I live in the most productive valley in the southwest. We have 16,000 acres under the Buckeye Canal, carry 18,000 head of cattle; run a $6,000 creamery, shipped out $100,000 worth of alfalfa seed last year and are now sending out $200,000 worth this year. I had from my own bees 66,000 pounds of honey, other bee men similar yields; we depend entirely upon irrigation.

Our farmers are very prosperous and should all take your valuable paper. I enclose you a list of a few of our enterprising irrigation farmers.

I am a subscriber and could not do without your paper.

Yours truly,

B. A. HADSELL.

BISHOP, INYO CO., CALIF., November 18, 1908.

The Irrigation Age Company.

DEAR SIRS—According to promise to Mr. Anderson during his visit to Owens Valley, I send you the following regarding some of the actions toward farmers here by so-called government employees. The stumpage charged for tamarisk, or black jack pine, is $4.00 per M.—very small logs, too; in fact, 120 logs make 20,000 feet of lumber. The stumpage charged the sawmills for fir and bull pine is $6.00 per M., and the lumber has to be hauled about forty-five miles by wagon, over a bad mountain road.

In the sugar pine belt, in the reserve, mills are charged $2.00 per M. for the best timber on earth. Why this great difference?

Then we are prohibited from selling derrick poles. All farmers use derricks in stacking their hay. They must be hauled 45 to 60 miles. We are given a permit for one pole, then told the pole must be stamped before being cut. Then when request is made that one be marked, you are told that they cannot afford to go so far to stamp one pole; that if they do it for one, people would keep them busy running to stamp poles. In other words, you are refused your derrick pole.

One applicant for a derrick pole is willing to make affidavit that the above was what was told to him only a few days ago, when he made application for a pole and booms. The man who grants permits and stamps poles has comfortable "headquarters" in the city of Bishop about 25 miles from the nearest timber and 45 miles from that suitable for derrick poles.

Farmers think they should have the right to get derricks and booms where they may be gotten at least expense, and should have the right to have some on hand to take the place of any that may be broken while in use.

Hoping this will be of service, and thanking you for any favors shown our valley, I remain, Yours

K. L. A.

WEST SOMERVILLE, MASS., December 3, 1908.

The Editor of IRRIGATION AGE, *Chicago, Ills.*

DEAR SIR—I have read with a great deal of interest for the past six months or year the different articles in your paper relative to the government irrigation works in the west. I notice from the general tone of your paper that you do not think very highly of the conditions that confront a settler on a government irrigation project as compared with those on lands owned by private companies or developed under the Carey Act. Now, I would like to ask you just what advantages the privately owned projects have to offer a settler over a government project. It would seem to me as a casual observer that an intending settler would find more favorable terms under the government from the fact that he would not have to pay interest on his land until it is paid for as he does on land bought under the Carey Act, etc. I understand from other sources, however, that the government is finding it hard to get settlers for its different projects while privately owned lands such as Twin Falls, Idaho, have nearly all their land taken at once. Can you enlighten me why this is and why such projects as that of the

government in Nevada, the Truckee-Carson, or the Sun River Project, etc., should lack settlers?

I am thinking somewhat of going west in the spring and would like to know just what the trouble is with the government irrigation projects that they are not settled better, and whether it would be better for me to buy private land such as you mention in your November number in the Blue Water Valley, etc.

As the government guarantees enough water on its land, and also has it drained properly with ditches, etc., and as there is no danger of its going into bankruptcy, etc., I can't see for the life of me why it isn't the best thing in the market. Could you favor me with the facts of the case. Also if possible let me know which project would be likely to offer a settler the best chances in the spring.

Yours respectfully,

E. E. BISBEE.

Mr. Bisbee will find in the following letter from Mr. H. L. Hollister some of the inducements offered by what are known as private projects.

Mr. D. H. Anderson, Editor IRRIGATION AGE, *Chicago, Ill.*

DEAR SIR—Referring to the letter of Mr. E. E. Bisbee of 341 Summer street, Somerville, Mass., to which you request me to make reply, I beg to make note of my observations of the practical workings of the Government Reclamation law and the Carey Act. In the reclamation act, the government has set aside the money derived from the sale of public lands to be devoted to the construction of irrigation works.

All lands under such irrigation systems are settled under the Homestead law, the farm unit ranging from 40 to 160 acres, and each unit representing a full homestead entry. Beyond the construction of the irrigating works and the sale of townsites, the reclamation service cannot go. Whatever is done in the way of improvement the people themselves must do. The homesteader is tied up for five years. He cannot leave his land and he cannot sell to advantage.

Whoever buys his relinquishment must go on and live the full five-year period before he can get title. He cannot borrow money on his equity to make improvements, because the law does not recognize any equity until he has made final proof and secured his patent.

These are severe conditions for which the reclamation service is in no respect responsible. The eminent men connected with the service are doing the best that can be done under the law, but the proposition is not an inviting one to a live, up-to-date man. It appears to one that it will take many years to realize that degree of development which has been predicted under the government projects.

Under the Carey act the government gives the land to the state to be sold to settlers at not to exceed 50 cents an acre, the state being authorized to enter into contract with private capital to construct the irrigating system. The state is allowed much latitude in fixing the conditions of settlement.

The government, in the Carey Act, requires that no person shall be permitted to take more than 160 acres, one-eighth of which must be reclaimed before full title is given.

The residence period for the settler is left to be fixed by the state, which has wisely made it 30 days, or during the period of publication of the notice of final proof. Persons 21 years of age or over each have a right to 160 acres under this act. Married women cannot file.

In the Twin Falls country, in which I am interested, the Carey act works out admirably to the advantage of the settler, the state and the investor who builds the irrigating system. Our company manifests its interest in every form of development. It has built the irrigating works for the great North Side tract and is at work on others.

It has colonized the tract with high-grade American citizens, it has platted the towns, and put in waterworks systems, it has established banks and built hotels, it had built twenty-five miles of railroad to accommodate the first settlers before water for irrigation had been turned into the canal system for the larger part of the North Side tract, embracing 150,000 acres. The company also has built a hydro-electric power plant at Shoshone Falls and power from that source has been in use for more than a year at Jerome. Power will be available for light, heat and power in all the settlements and in remote parts of the several vast tracts which are embraced in the Twin Falls country.

With all these helps, the Twin Falls region has prospered beyond all expectations. Twenty thousand people or more have taken possession of the South Side tract in three or four years, and twenty thousand more will soon be established on the North Side tract. Some of the land has advanced more than 1,000 per cent in value and the top has not by any means been reached.

It is to the advantage of the company to have the land settled quickly and it is just as advantageous to the settler to have it so. In proportion to the investment the settler's profits are many times greater than those of the company.

One more point in favor of the Carey act is that the installment period may be extended to suit the amount of the total payment while under the Government Reclamation act it is ten years, all payments to be equal. Under our plan the down payment is $3.25 an acre and during the first few years the payments are small, giving the settler a chance to develop the earning capacity of his property. On our Twin Falls Salmon tract the installment period is twelve years. The price at which water rights shall be sold is fixed by the State Land Board, based upon the estimated cost of the irrigating works and the expense of carrying the business through the installment period.

The good feeling existing between the company and the settler is a frequent subject of remark. The company's policy has been not merely just, but at all times most liberal. The human element is evident in all the dealings between the settlers and the company and the results are such that people have been attracted in great numbers and have added to the general prosperity of the region. The Carey Act certainly has a most wonderful vindication in the development of the Twin Falls tracts.

Yours very truly,

H. L. HOLLISTER.

In a communication from Mr. A. L. Rinearson, a civil and mining engineer, of Boise, Idaho, dated November 16th, he asked a question concerning the proper understanding of acre feet when speaking of the capacity of a reservoir.

The editor of this journal was not in position to reply to him directly and submitted the matter to one or two engineers of good standing, and sent a reply to Mr. Rinearson based on suggestions received from them.

We are printing Mr. Rinearson's letter, in full, in this issue with the reply which was subsequently sent him by the editor and an answer to that communication by Mr. Rinearson. It will be seen by going over the letters following that we are desirous of getting the opinion of engineers throughout the west concerning this inquiry. We, therefore, request all engineers to whose notice this may be brought to write us their opinion of an acre foot as applied to the capacity of a reservoir.

BOISE, IDAHO, November 18, 1908.

THE IRRIGATION AGE, *Chicago, Ill.*

In about all of our projected works for irrigation, we speak of acre feet when talking of the capacity of a reservoir.

Now, in your varied experience, how much land will one acre foot (43,560 cubit feet) irrigate?

I ask this question in a general way. Of course I know that it varies with each locality. I have asked several engineers this question and I was surprised what a difference of opinion there is among them. To my mind it shows that few, if any, have tested the actual usefulness of an acre foot, as applied from a reservoir to irrigation. Answers to my question are from 1 to 3 acre feet. I cannot answer it for lack of definite information. Of course I can guess what our soil would use. I am working out the plans of an irrigation system, with reservoir. The soil is our Payette Lake bed and in our locality inclines to clay—that is 50 to 65 per cent is clay.

I enclose stamp for personal reply.

Very truly,

A. L. RINEARSON.

December 8, 1908.

Mr. A. L. Rinearson, C. E., Boise, Idaho.

DEAR SIR—Your favor of November 18th was delayed in reaching the writer's hands, owing to absence on the Pacific Coast.

(Continued on page 89.)

Great Future for Shoshone, Idaho.

Reclamation of Surrounding Lands Opens Promising Outlook for Town.

Shoshone is one of the pioneer villages of southern Idaho. Its primitive resources were the machine shops of the Oregon Short Line Railroad Company, and the patronage of the sheep and cattle men of Blaine and Lincoln Counties. Under the sole influence of these enterprises it acquired, in the early nineties, a population of over 1,000 persons. On the removal of the machine shops to Pocatello it was predicted by the pessimist that ten years in the future would see the streets of the unfortunate village filled with jack-rabbits and coyotes; but the optimist, hoping, apparently against hope, that something would emerge from the sage-brush deserts that would restore to the town the prestige and support of which the removal of the shops had deprived it, stayed with Shoshone. Subsequent to the removal of the shops, it is true that for a number of years the town suffered a period of retrogression; but at length the dreams of the faithful were realized, though in a manner wholly unanticipated, and so soon as the process of reclaiming, under the government reclamation and the Carey acts, the arid lands of Lincoln and neighboring counties was begun, activity and progress were again in evidence. Vacant houses became at a premium, building was again resumed and land values increased rapidly, and it is today more prosperous than ever before during its entire past history.

The business transacted here, as evidenced by the reports of commercial travelers, and substantiated by the volume of freight handled through the railroad company's local agent, is greater than that of any other town in Lincoln County, of which Shoshone is the capital. This last mentioned fact should itself contribute much to the future of Shoshone, as Lincoln County is unquestionably destined to become one of the wealthiest and most densely populated counties of southern Idaho. Including the Twin Falls North Side, the Wood River and Alberta segregations of Carey act lands; the Minidoka government and the proposed additional government projects, together with the deeded farms and the new segregations of both the Twin Falls North Side and the Idaho Irrigation Company, this country will itself have a total area of not less than 650,000 acres of reclaimed soil. Shoshone is favorably situated for a commercial center for these entire combined tracts, and is already beginning to respond to the influence of their reclamation, notwithstanding the fact that very little of the land has yet been subjected to cultivation.

Shoshone is also the junction of the Hailey branch and the main line of the Oregon Short Line Railroad, and is, hence, the gate city to the rich agricultural and mining districts of Blaine and Custer Counties. It now has a permanent and steadily increasing population of over 1,200 persons, and some of the best and most substantial improvements of any town in southern Idaho. New buildings for both business and residence purposes are constantly in course of construction; cement walks are laid in almost every portion of the city; new additions are being platted and placed on the market and readily taken up, and every thing points to a continued and increased growth.

There are two national banks, with the promise of a third one, which are rated among the most substantial institutions of the state; two first class hotels which are taxed to their utmost capacity in their efforts to accommodate the public; three large lumber yards; a number of important mercantile establishments, and many other enterprises which go to make up a prosperous village. Its two elegant schools, five churches, court house and other public buildings will compare favorably with those of many cities several times its size.

While it cannot be definitely predicted whether or not the railroad company will reinstate their shops at this point, it is beginning to look very probable and is at least a well known fact that more men are employed in and about the round house and repair buildings than for many years past.

Shoshone is favored with both an abundant water supply and a good electric lighting system. Local parties are contemplating establishing a brick yard and cement-block factory, and it is quite certain that a flouring mill and elevator and a steam laundry will be installed at this point in the near future. With the opening of the Idaho Irrigation Company's new segregation, just east of town, in the spring, it is anticipated that Shoshone will make a marked and rapid growth, and that property values, which are now reasonably low, will advance to a comparatively high figure. While there are now many attractive residences in course of construction, it is almost impossible to find a vacant office or dwelling house, and the public schools are almost filled to overflowing, the attendance being larger than ever before in the history of the village.

While a stranger to the process of a boom, Shoshone is making that steady and permanent growth and advancement that must of necessity be the basis of all substantial cities.

Reclamation Service News

The Secretary of the Interior has restored to entry the following described lands which were withdrawn under the first form in connection with the Shoshone irrigation project. Wyoming-Montana: Montana Principal Meridian —Montana—Townships 7 and 8 S., R. 25 E., all Secs. 25, 26, 27, 34, 35, 36, 1, 2, 3, 11, 12, 13 and 24; townships 7 and 8 S., R. 26 E., all Secs. 19 to 36 inclusive; 1 to 30 inclusive, and 32 to 36 inclusive; township 7 S., R. 27 E., all Secs. 19 to 36 inclusive; township 8 S., R. 27 E., all; township 7 S., R. 28 E., all Secs. 19, 30 and 31.

The Secretary of the Interior has restored to the public domain the following described lands which were withdrawn from entry under the first form, in connection with the Minidoka project, Idaho-Wyoming—Township 45 N., R. 114 W., Secs. 34 and 35.

The Secretary of the Interior has withdrawn from entry, under the second form of withdrawal, in connection with the Rio Grande project, New Mexico, the following lands: New Mexico Principal Meridian—Township 26 S., R. 2 E., all Secs. 1, 2 and 11; N. ½, N. ½ S. W. ¼, N. W. ¼, S. E. ¼ and lots 1, 2, 3 and 4 of Sec. 12; township 26 S., R. 3 E., W. ½ N. W. ¼, W. ½ S. W. ¼ Sec. 5; all Sec. 6; N. ½ N. E. ¼, N. E. ¼ N. W. ¼ and lots 1, 2, 3, 4, 5 and 6 Sec. 7; lot 3, Sec. 8; township 29 S., R. 3 E., lots 1, 2 and 3, N. W. ¼ N. W. ¼, S. ½ N. W. ½ and S. ½ Sec. 2; lots 1, 2, 3 and 4, S. ½ S. W. ¼ and S. W. ¼ S. E. ¼ Sec. 1; all fractional Sec. 12; township 29 S., R. 4 E., all fractional Secs. 16, 17 and 18.

The Secretary of the Interior has restored to entry

(Continued on Page 91.)

SHOSHONE LAND COMPANY
SHOSHONE, IDAHO
Improved Irrigated Farms. Homesteads with Government Water Right.
CAREY ACT RELINQUISHMENTS WRITE FOR PARTICULARS

(Continued from page 87.)

I am somewhat at a loss to answer your inquiry. The maximum depth of water which can be used on land, for instance under the Wyoming law, is 3.43 feet. Experiments in that state have shown that a maximum depth actually used to advantage is 2.55 feet. The average use being 1.5 feet and the minmium 0.6 feet; that is to say, on an average an acre of land would require 1.5 acre feet of storage water for its practical irrigation. This would, no doubt, vary in different localities according to the capacity of the soil.

I am inclined to think, Mr. Rinearson, that it would be a good plan for me to print your letter leaving off your name if you so suggest, or use it if you prefer, and submit it to the engineers of the country, then publish their replies so that we could arrive at some reasonable base.

If you think this advisable, kindly notify me and I will publish your inquiry in our issue of January.

I am, Yours very truly,

D. H. ANDERSON, Editor.

BOISE, IDAHO, December 14, 1908.

Editor IRRIGATION AGE, *No. 112 Dearborn Street, Chicago.*

DEAR SIR—I thank you for replying to my November 18th in your letter of December 8th with reference to the quantity of land in acres irrigated by an acre foot of stored water. I did not know that the irrigation capacity of an acre foot of store water was as low as .6 of a foot.

Your suggestion that my question be submitted to the engineers of the country is certainly a good one. If those who answer the question will state the nature of the soil they have had experience with as to the approximate per cent of sand and clay or other admixture it will be most valuable to those who are called on to study and solve any storage system for irrigation purposes.

Yes, use my name. It cannot detract anything from a question so important as this.

Very truly yours, A. L. RINEARSON.

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THE IRRIGATION AGE is the only journal of its class in the world and has been published for 24 years in this interest. If you care to keep in touch with irrigation development read THE IRRIGATION AGE.

THE WESTERN WORLD is publishing a series of articles on the surveyed unappropriated government lands of the United States still open for entry, with maps giving locations, from quarter sections to sections. Its articles give details of the nature of the soil in all townships in which there is homestead land open for entry. Start it now.

ADDRESS

IRRIGATION AGE

112 Dearborn Street : Chicago, Ill.

GOVERNMENT LAND

Open to Settlement

Some of the richest and most productive farm land in the world lies in the "Big Horn Basin" of Wyoming. The United States Government is spending seven million dollars in building great concrete dams and ditches in order to lead an inexhaustible supply of water to irrigate some of the best of these lands and make them independent of rainfall. A great portion of this work is completed and

The Government Now Offers the Land to You

Under certain conditions you have the opportunity to get from the Government a wonderfully productive farm, with water whenever you want it, regardless of rainfall; in a country where a single crop can be made to pay for the land; where 50 bushels of wheat or barley, and 75 bushels of oats are commonly grown to the acre; where fruits grow luxuriously and where the glorious air and sunshine, summer and winter, makes life a joyous thing.

This wonderful country is developing fast. Churches and schools abound. The population is intelligent, God-fearing and law-abiding, and any man out there who is half a man has the opportunity to quickly make himself independent.

Land in this great country is going fast. If you have any thought for the welfare of yourself or children find out all about this offer from the United States Government.

Reduced railroad rates on the first and third Tuesdays of each month. On these dates I will personally conduct Landseekers' Excursions to the Big Horn Basin, to show these lands. **Come with me** on the next excursion and see for yourself—my services are free.

Send for our new folder, with large map, and **also folder issued by the Reclamation Service of the United States Government, giving all information about these lands, terms, etc. Free for the asking. Address**

Burlington Route

D. CLEM DEAVER, General Agent
Landseekers' Information Bureau
59 Q Building, OMAHA, NEB.

THE UNEQUALED EFFICIENCY OF THE CENTRIFUGAL PUMP IN IRRIGATION.

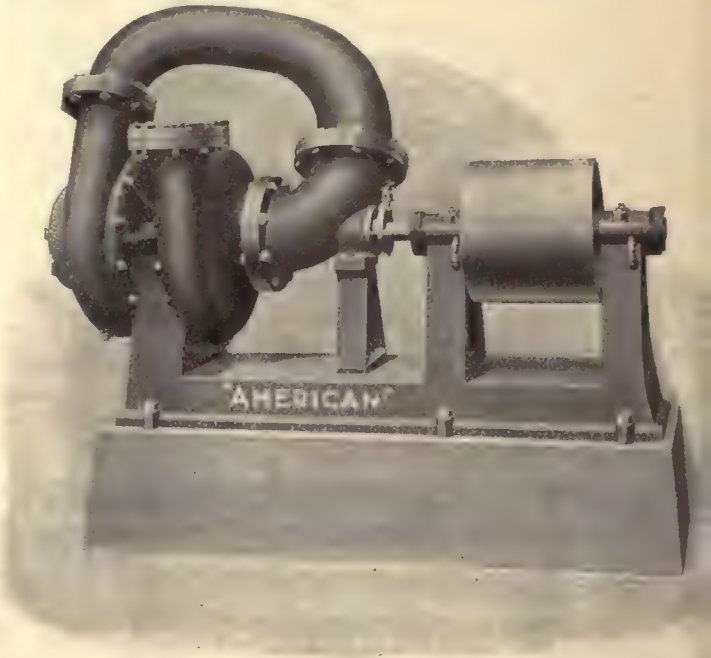
Many persons engaged in irrigation farming are not aware that where water must be elevated to the land and in conditions favorable to the installation of centrifugal pumps, this type of pump has a much higher efficiency than any other. Pumps of this type frequently attain an efficiency of 80 per cent of the mechanical power and also have the advantage over any other pump of having no valves or other delicate parts likely to get out of order.

Conditions favorable to centrifugal pump installation are wherever the pump can be placed close to the water supply so that the head in the intake pipe will not be greater than will be overcome by the force of gravity. This may be either in pumping from rivers, creeks or canals, or from wells of sufficient size to admit a centrifugal of the vertical type.

In the accompanying illustration is shown the two-stage type of centrifugal made by The American Well Works, Aurora, Ill. The makers of this pump affirm that it attains unusually high efficiencies for the reasons that the impeller is accurately machined to the casing and has a perfect cut-off at the outlet, making it impossible for water to pass the discharge pipe and be repumped, and there is no sudden change of direction of the water in passing through the pump. In the multiple stage pumps the connection between the stages is by means of long pipe bends of increasing diameter, affording an easy flow and reducing friction to the minimum.

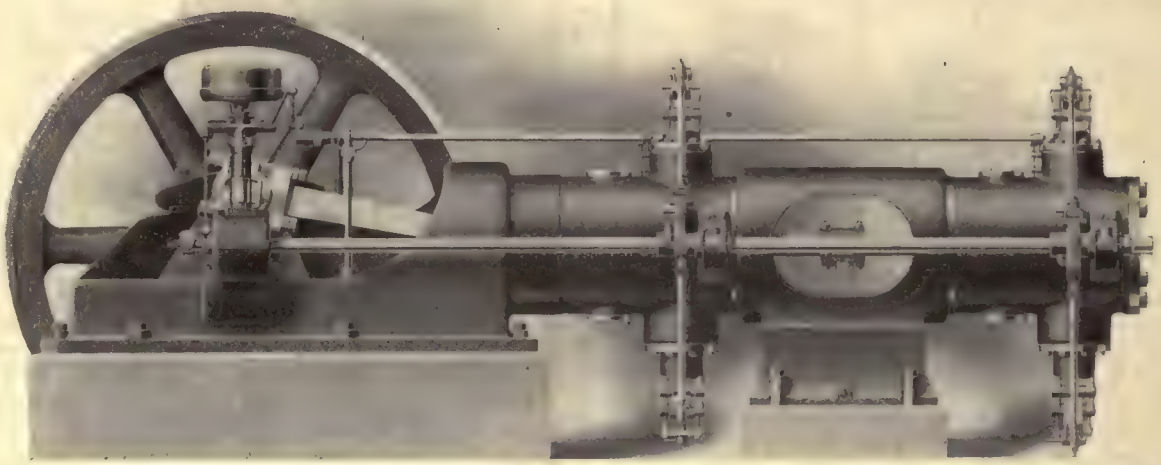
These features enable the single stage centrifugals of this make to operate against total heads up to 125 feet and the two stage pumps up to 250 feet, with corresponding increase for additional stages, and attain an actual mechanical efficiency of 60 to 80 per cent.

The manufacturers of this pump issue a free bulletin entitled "Cost of Irrigation," which gives much practical data on costs of pumping which should be of interest to every irrigator.



Two Stage Type of Centrifugal Pump.

The BUCKEYE FOUR-CYCLE GAS ENGINE



SIMPLE IN CONSTRUCTION - ECONOMICAL IN OPERATION - RELIABLE

CATALOG ON APPLICATION

BUCKEYE ENGINE COMPANY, - - Salem, Ohio

RECLAMATION SERVICE NEWS

(Continued from Page 88.)

the following described lands which were withdrawn under the first form, in connection with the Yuma irrigation project, Arizona-California: San Bernardino Meridian—California—Township 9 N., R. 23 E., N. E. ¼ N. W. ¼ Sec. 30.

The Secretary of the Interior has restored to the public domain the following described lands which were withdrawn under the first form of withdrawal, in connection with the Yuma irrigation project, Arizona-California, such lands no longer being necessary to the interests of the project: California. San Bernardino Principal Meridian —Township 9 N., R. 23 E., N. E. ¼ N. W. ¼ Sec. 30.

On November 14 the Secretary of the Interior awarded contract for furnishing one 500 K. W. turbine electrical generating unit for use in the power plant for the Williston and Buford-Trenton irrigation projects, North Dakota, to Allis-Chalmers Company, of Milwaukee, Wis. The contract price is $13,200.

The Secretary of the Interior has signed a contract on behalf of the United States with J. E. Hilton of Vale, South Dakota, for the construction of a portion of the lateral system of the Belle Fourche irrigation project, involving the excavation of approximately 103,000 cubic yards of material at a cost of $17,843.

The Secretary of the Interior has restored to the public domain, to be subject to settlement under the public land laws of the United States on and after February 23, 1909, but shall not be subject to entry, filing or selection till March 25, 1909, the following described lands in New Mexico, which were withdrawn for reservoir purposes: New Mexico Principal Meridian—Township 26 S., R. 2 E., all Secs. 3, 4, 9, 10, 13 to 16 inclusive, 21 to 28 inclusive, 33 to 36 inclusive; township 27 S., R. 2 E., all Secs. 1 to 4 inclusive, 9 to 16 inclusive, 21 to 28 inclusive, and 33 to 36 inclusive; township 28 S., R. 2 E., all Secs. 1 to 4 inclusive, 9 to 16 inclusive, 21 to 28 inclusive and 33 to 36 inclusive; township 29 S., R. 2 E., all Secs. 1 to 4 inclusive and 9 to 16 inclusive; township 29 S., R. 3 E., all Secs. 3 to 11 inclusive and 13 to 18 inclusive.

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For a dress shoe, wear "HONORBILT"

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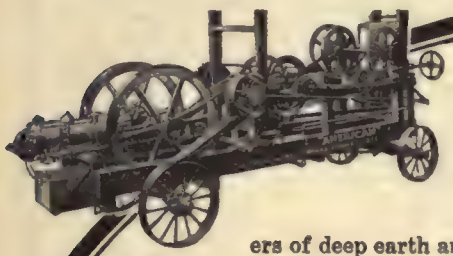

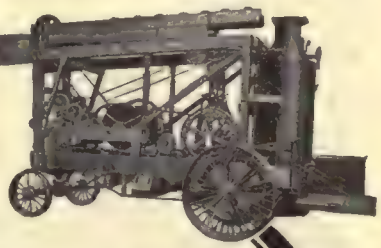

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fulfill every condition of deep drilling because we do not recommend one machine for every purpose but for every kind of earth and rock drilling we have an independent type of drill especially designed to meet the requirements.

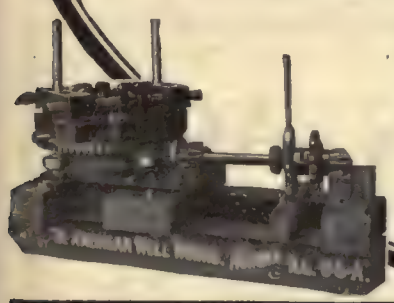
The deepest wells in the world were put down by our machines.

Practically all of the oil wells in the Beaumont, Texas field were sunk by our machines—many of them at the rate of 1,000 feet a day—after a half a dozen other makes of machines had been thoroly tried and did not succeed in putting down a single well in the caving quicksands encountered in that locality.

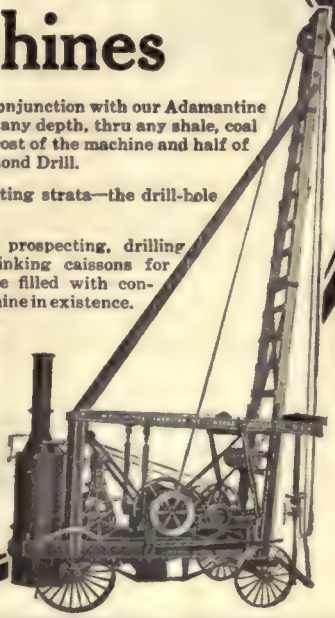
Our Coring Machines operating in conjunction with our Adamantine Process will remove a core of any size, any depth, thru any shale, coal or rock formation at half the initial cost of the machine and half of the expense for maintenance of a Diamond Drill.

It is unaffected by crevices and tilting strata—the drill-hole is always perfectly plumb.

For any kind of ore, metal or coal prospecting, drilling for hydraulic plunger elevators or sinking caissons for bridge and building foundations—to be filled with concrete—this is the most economical machine in existence.



Our new, free, 196 page, 8x11 inch Catalog —the most Complete "Drill-hole" Catalog ever issued—is now ready for Distribution.



THE AMERICAN WELL WORKS

General Office and Works: Aurora, Ill., U. S. A.

Chicago Office: First National Bank Building.

THE MAN IN THE MOON.

A five-year-old boy, with his hands thrust deep in his pockets, stood on the front porch, watching the full moon rise. "Mamma," he ventured, thoughtfully, "I know why there is a man in the moon!"

"Why, son?" asked the mother listlessly.

"Why, there had to be some one there to put out the light when daytime came, and God knew it would take a man to do it."—The December Circle Magazine.

THE STAR BOARDER'S REFLECTION.

Landlady—Mr. Star, now that we are seated about the board to partake of our Christmas turkey, does it not occur to you that there were only two turkeys on the Ark with Noah?

Mr. Star—Indeed, it is forcibly brought to mind. I sincerely hope that this one is the last of the two.—The December Circle Magazine.

POTATOES PAY

Make them pay by using the machines that really do the work—

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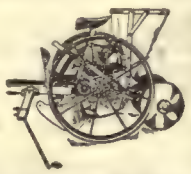

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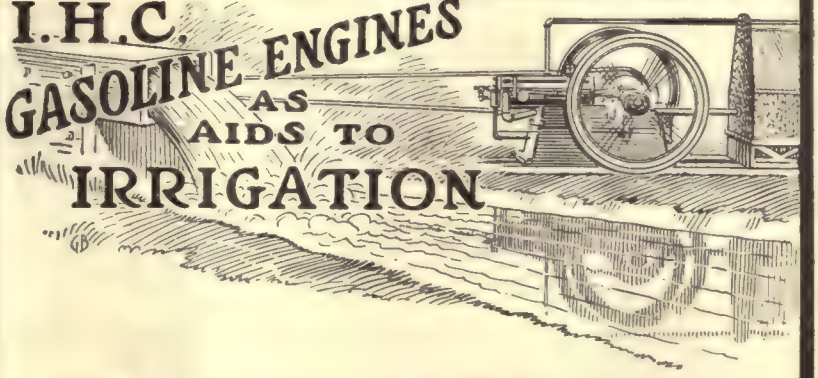

Almost every farmer has a few acres of land that lie too high to be irrigated from his laterals. To flume or siphon the water to these few acres is not practicable on account of the expense. And yet to let this land lie idle means a big hole in the profits of the farm each season.

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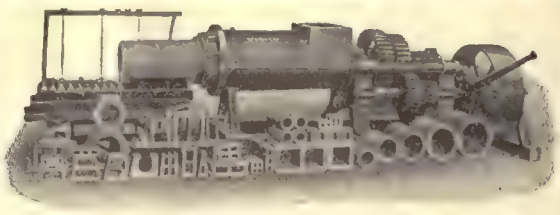
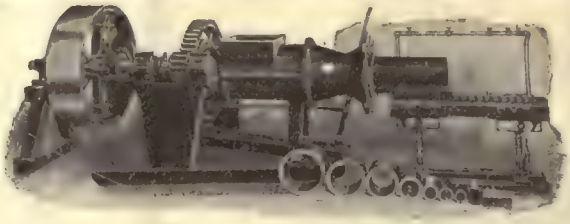


Centennial Auger Machine



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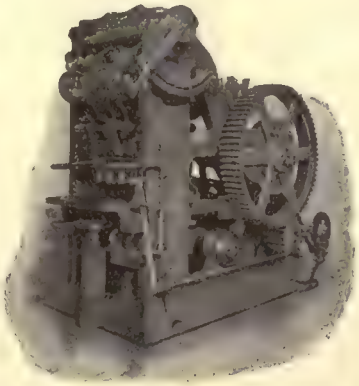

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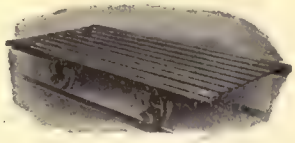

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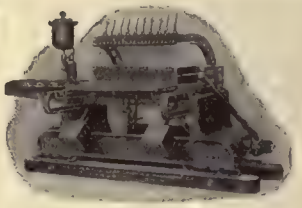

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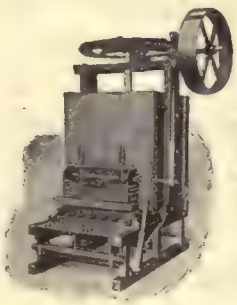

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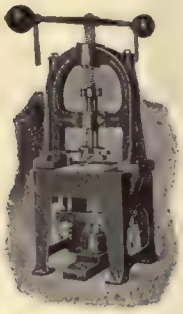

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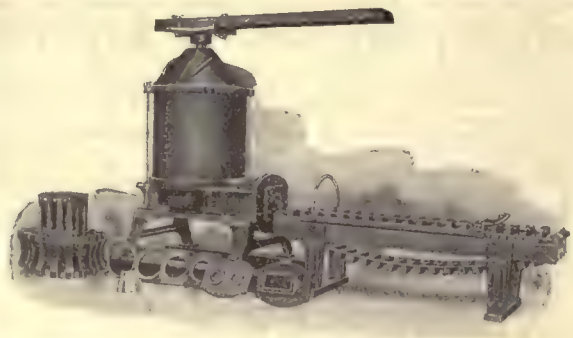

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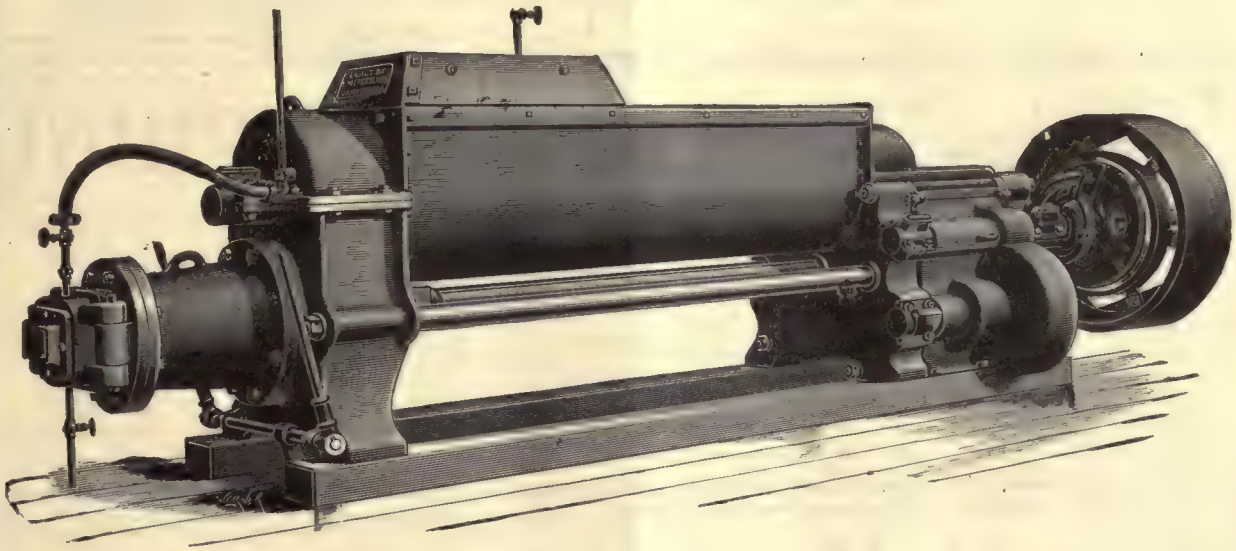

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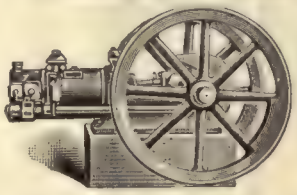

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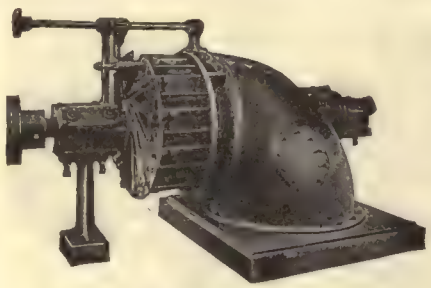

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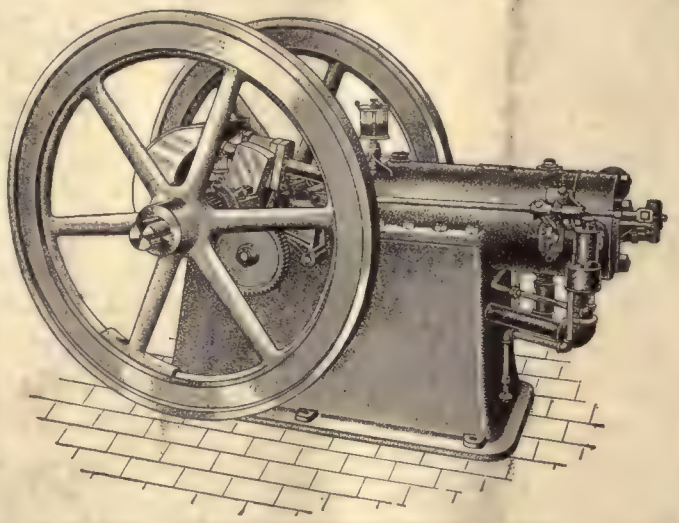

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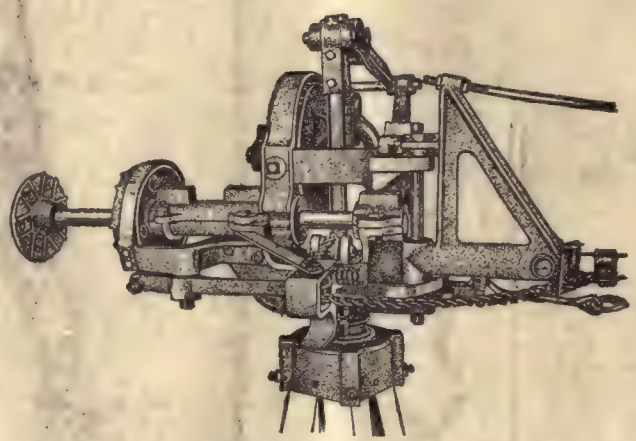

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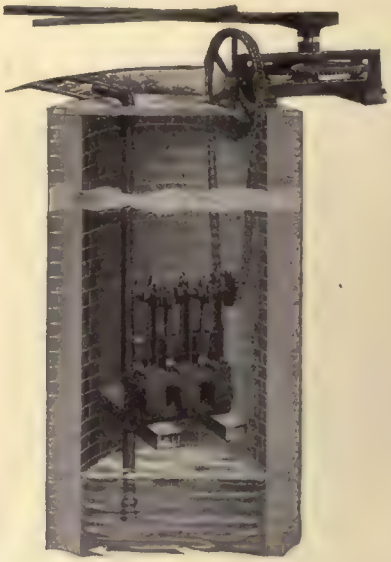

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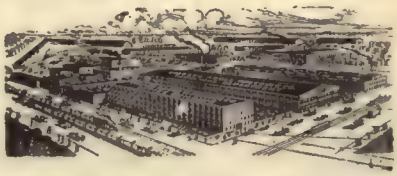

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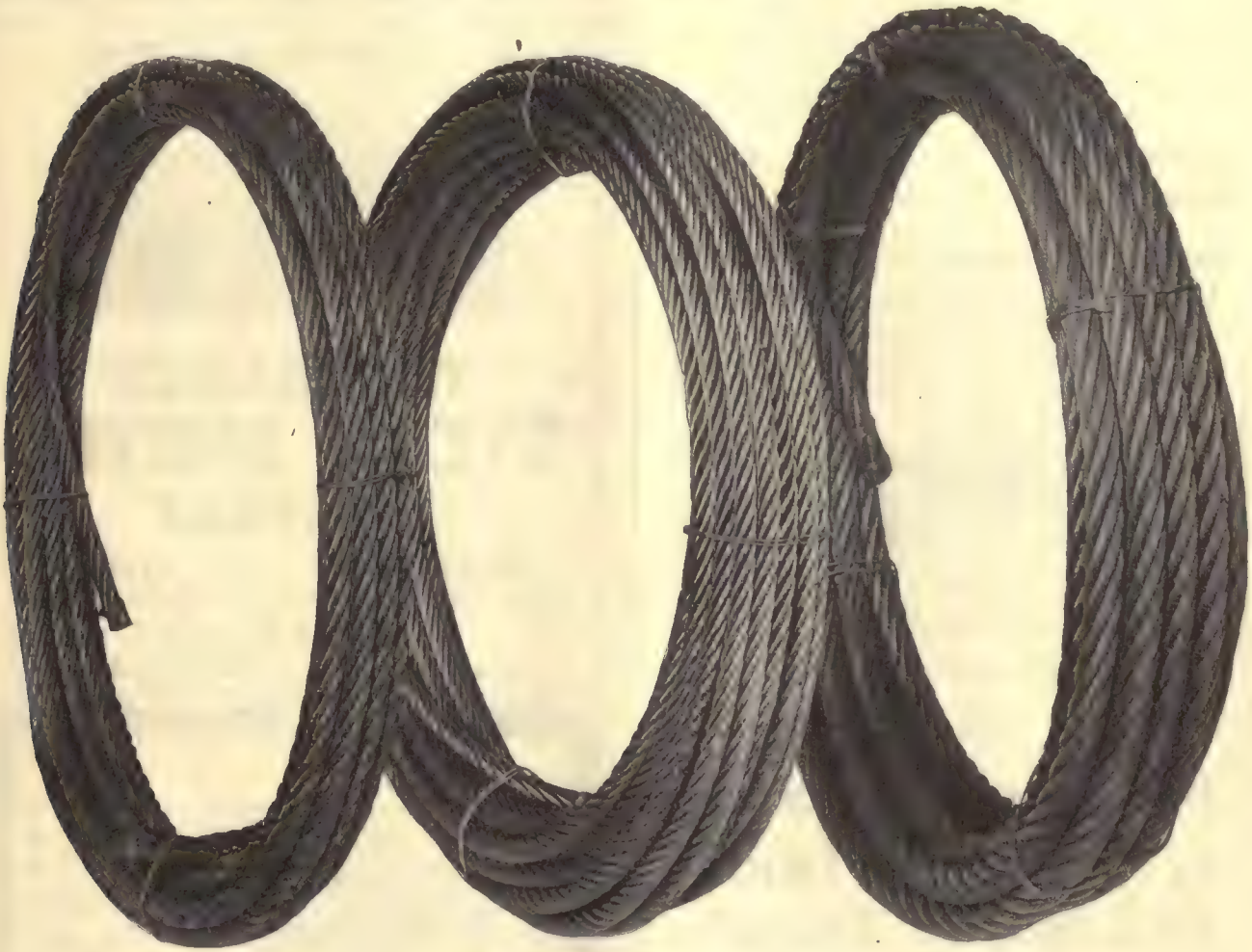

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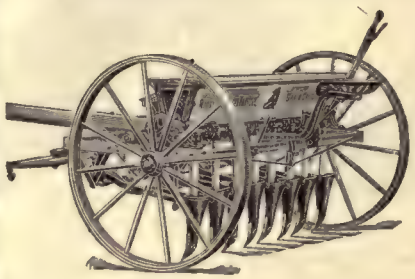

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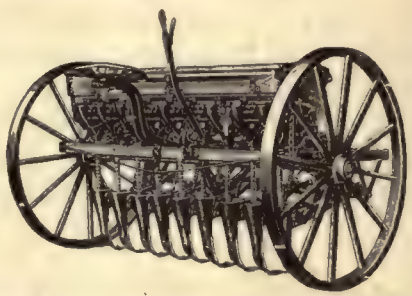

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THE IRRIGATION AGE

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THE IRRIGATION AGE
With which is Merged
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THE IRRIGATION ERA — MID-WEST
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IRRIGATION AGE COMPANY,
PUBLISHERS,
112 Dearborn Street, - - CHICAGO

Entered as second-class matter October 3, 1897, at the Postoffice at Chicago, Ill., under Act of March 3, 1879.

D. H. ANDERSON, Editor

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It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 24 years old and is the pioneer publication of its class in the world.

Irrigation Securities.

Looking forward along the lines of the country's commercial activity for the year 1909, there is no industry that promises so much achievement, so great an advancement and increase in values and so large a return on the capital invested from the banker's and investor's point of view, as well as that of the actual farmer, as securities in irrigated land.

This is by no means a new industry, yet comparatively little attention has been given it as a field for investment for the banker and investor, and as great an opportunity for the manufacturer to develop new business. All of the people are awakening to the marvelous possibilities of irrigation in the Rocky Mountain states and the immense amount of actual wealth that will be added to the world's store by the cultivation of this now arid and idle land. Hundreds of irrigation projects all over the far west are being exploited, and millions of capital are being invested in arid lands and water rights. Stocks and bonds on these properties that formerly could scarcely be sold at all are finding an excellent market in the central west.

We have long looked upon the Rocky Mountain states as mining territory, vast stretches of semi-arid tableland with some fertile valleys where stock could be grazed, territories which would always depend on the agricultural states for foodstuffs, implements and clothing. Today, we know that when the land that can be irrigated has been brought under the ditch and the plow, we shall have an empire that acre for acre will be far more valuable and productive than the fertile fields of Iowa and Illinois.

Irrigation is as old as civilization. As it is being carried on in the west today, it has all the indications and effects of a new industry. The work of reclaiming the desert on so large and extensive a scale is costly. It means the changing of the topography of parts of the country. Immense masonry dams storing millions of acre feet of water, canals that carry a river's flood and the damming of rivers themselves, all require a combination of vast energy, expensive machinery and engineering ability of the highest type. The greatest part of the work is being done by the government and by large corporations. Many of these corporations are expending millions of dollars to develop their projects, while there are any number of private projects that swell the total expenditure far into the millions, annually.

The financing of the many irrigation projects now under way has been carried on very quietly. It is unusual that such enterprises as are now under construction should have been promoted with so little display and such scant notice in the financial world. It only serves to show how solid and safe these projects are. Yet, what security equals that of land? The failure of irrigation projects have been so few as to be a negligible factor in the history of the industry as a whole. It is not impossible to believe that there

will be questionable projects as there are wild cat mining companies, but it will prove far more difficult to promote a gold brick irrigation scheme than other swindles, as the nature and character of the project makes it easy to determine the actual value of the security.

The future of the irrigation industry from a purely investment point of view opens up truly wonderful possibilities. As has been stated, the great money centers of the east have not yet taken advantage of these opportunities along investment lines. Recently the writer in conversation with one of the officials of the largest engineering concern in the country, remarked this tendency among the financiers of the east. This gentleman replied that it was a fact that the New York bankers do not, just now, look with favor upon all irrigation securities. "But," he said, "it is only a question of a little time until they will be reaching out for this class of investments and stocks and bonds of irrigation companies will find a ready market in the east."

What form of investment can be as safe as that secured by productive land or the water right to irrigate such land? Are the bonds of railroads, municipalities, city lighting and water companies any better? It would hardly seem so and it is only a question of time until this will be a proven fact.

There is no other industry the development of which will increase the wealth of the country in so great a degree as that of irrigation. Its development directly affects practically every manufacturer. As there is no other industry growing so rapidly with an equal amount of money involved, this great field merits careful consideration by the banker, the investor and the manufacturer.

It is surprising to note the growing interest in irrigation which has been aroused among the people of the cities, who are just learning of its possibilities as a field for investment. As yet the opportunity to buy irrigated farms has been generally confined to the farmers of the central western states and no attempt has been made to reach the residents of cities. During the last year, however, hundreds of men in Chicago have gone to the west and southwest and secured tracts of land. These lands are sold on the easy payment plan so that men of moderate means may easily secure a valuable farm by a small cash payment. A feature of these investments, too, is that they are not of a speculative character. They are being made as an investment with the desire of either a home or fair and safe return on the capital. Most of these investors buy this land with the intention of becoming citizens of the new country. It may be safely asserted that the irrigated lands now being opened for settlement are drawing more men from the city than the unirrigated land, and irrigation is helping more than anything else to solve the great problem, "How Shall We Get the Landless Men to the Menless Lands?"

Irrigation farming is the most profitable because it is the most intensified method of agriculture. Millions of acres now arid and practically valueless will, in a few years, be watered and produce untold wealth. Irrigation on an extensive scale is just getting well started and with its development will come the opening of mines of all kinds in which the Rocky Mountains are so rich and as yet undeveloped for lack of capital, of railroads and cheap material. Irrigation will bring the railroads sooner than anything else.

Much has been said of the "Last West," meaning the last of the government homestead lands that were practically a gift to the hardy pioneer who braved the wilderness and waited ten, twenty, or thirty years for civilization to come to him. True, these lands are gone and in their place is irrigation, and instead of it requiring a score of years to develop a new country, where water is turned onto the arid lands, modern cities and farming communities are developed in a single season.

Irrigation is the latest chapter in the agricultural development of the country. To those who follow it, who read the signs of promise and consider the wonders it has already accomplished, it marks an epoch—an era of growth and wealth making that is almost beyond belief and is more like a dream than a reality.

As yet the wonders and possibilities of irrigation are more potential than actual, just as all of the water flowing into the sea would furnish light, power and heat for the world, with this difference, that all of the power cannot be utilized while practically all of the land can.

Here then is the great open door for development not alone for the farmer. It is the opportunity for the banker to get the safest and best return on his idle capital; it is the opportunity for the manufacturer to develop a new field for his product and it is a splendid opportunity for the salaried man and man of small means to get for himself at a reasonable cost property that in a few years will provide not only a home but a competency.

This year will see greater development in this field than any previous one and those who grasp the opportunity now will profit more than those who come later.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

Seventeenth Irrigation Congress.

The Seventeenth National Irrigation Congress is to be held at Spokane, Washington, August 9th to 14th, 1909. This gathering will be attended by from four to five thousand accredited delegates, and it is certain that with the publicity given, twenty-five thousand people will be entertained in that delightful city during the week of the meeting. Special efforts will be made to induce people from the central and eastern states to stop off at Spokane for a few days en route to the Alaska-Yukon Exposition which will be held in Seattle.

THE IRRIGATION AGE will make its April edition a special Irrigation Congress number of 120 pages of finely illustrated matter concerning the northwest.

All of the larger irrigation enterprises will be written about and illustrated, and taken all in all, this will be the most elaborate publication ever gotten out along irrigation lines.

It is our impression that the various interests along the lines leading to Spokane should carry an advertisement in this number, which will contain an invitation to visitors and delegates to the Congress to stop off and investigate the possibilities of their respective localities, both from an agricultural and commercial point of view.

Why Was the Owens River Project Abandoned?

The citizens of Inyo county, California, have asked this very pertinent question and the Reclamation Service people may find it necessary to furnish a detailed reply at some early date.

The records show that the abandonment was made by the acting Secretary of the Interior during the absence of the Secretary on a tour of inspection of the varied projects. About the middle of July, 1907, a few days before he started on this trip, the citizens of Owens Valley forwarded to him a petition setting forth their rights and praying for a hearing. In this petition they conceded the justice of granting municipal water to the city of Los Angeles under the act of April 16, 1906, which was an act to make provision for all municipalities under the Reclamation Service. In the petition the citizens set forth their claims to certain storage rights and water appropriations which had been turned over to the Reclamation Service officials on the ground, at their urgent solicitation, including a reservoir with a capacity of 200,000 acre feet; this tender was made direct to the Reclamation Service in Washington through the Hon. Francis G. Newlands of Nevada, and this petition, along with several others relative to the rights of these people have never been acknowledged and no opportunity whatever has been given the people of that valley to clearly set forth their rights.

During Secretary Garfield's trip, both at Reno and Los Angeles, he was within a day's ride of the Owens River Valley and two day's time would have sufficed, so the citizens state, to have made a careful inspection of this project and have given the citizens an opportunity to be heard upon their petition.

Evidence in the possession of the Owens River Valley people shows that a pack train of the Geological Survey at work in the Valley was sent to Independence and remained there several days awaiting the arrival of the party to carry them over the Kearsarge trail into the Kings River country.

About this time a rumor from Los Angeles indicated that the project had been abandoned, but the citizens refused to believe that such action would be taken without granting them a hearing to which they were entitled under the law and rules of the Department. They made repeated efforts to get in touch with the Secretary to arrange for a meeting. After the expiration of eighteen days, and after the Secretary had left for the East, official notice was received abandoning the project. The letter shows that this action was taken on July 12th; the letter of announcement was written on July 22d and received in Owens Valley July 27th. Subsequent to this action it has developed that the Acting Secretary is the same individual who had been instrumental in preparing the Act of June 30, 1906, in favor of the city of Los Angeles, and that said Act as at first submitted to Congress was prepared in his office.

The citizens of Inyo County still refused to believe that Secretary Garfield was an intentional party to such action.

In order to fully comprehend what was thus carelessly thrown aside by the Reclamation Service, a general glance over the situation will be necessary.

The evidence shows that the investigation of the Service covered only one-half of the water available for reclamation, and even upon this basis the project was declared feasible, and one of the largest and cheapest in the west, and that upwards of 100,000 acres of government land would be made available to settlement in addition to supplying the full needs of the patented lands.

The great basin of the Mono Lake watershed, which lies adjoining the upper waters of Owens River, was, it is stated, intentionally left out of the calculations of all the engineers. Mono Lake is about two-thirds the size of Owens Lake, but the rising of its levels for the past twenty years proves that it receives nearly as much water as the latter. The lake surface of the two basins is approximately 140,000 acres. The known evaporation and fluctuations of levels shows an annual precipitation equivalent to from 750,000 to 1,000,000 acre feet. It is safe to say that the amount available

for irrigation would be considerably in excess of this amount.

The Sierra Nevada forms a range nearly 350 miles along the western border of these two basins. The altitude of this range is from 11,000 to 14,500 feet, making an area of nearly 1,500 square miles which lies within the belt of heavy snow fall, and subject to more or less rainfall in the summer seasons. The Mono Lake basin and Long Valley at the headwaters of Owens River also lie within the snow belt. These, together with the White Mountains, and other ranges lying to the east of these valleys gives another 1,500 square miles lying within the range of moderate annual rainfall. All of these upper lands are water bearing. The total area of the two great basins aggregate upward of 2,500,000 acres.

From this source of water supply, it was possible for the government to have reclaimed upwards of 350,000 acres of as fine a body of land as is to be found anywhere throughout the great interior basin, nearly all of it lying below the 4,500 foot level, and capable of producing any crop outside of citrus fruits. By an extension of the system there could have been included 200,000 acres more land on the eastern slope of the Sierras.

The Reclamation Service also had within its control a large part of the main channel of the Owens River, and several of the smaller streams. The fall between Long Valley and the Owens Valley is over 2,000 feet. The power available and which could have been applied to the pumping of water upon the lands to the south and east would have been sufficient in itself to have reclaimed 100,000 acres.

These lands lie in the midst of the greatest mining regions of the west. The streams furnish sufficient power to make this rich and populous as the coal regions in the east.

The citizens of Owens Valley had developed by their own unaided efforts a very great canal system, aggregating nearly 200 miles in length of main canals, with a carrying capacity of upwards of 40,000 inches, and had in process of reclamation a large and fertile body of land. They found during the dry years, eight or ten years ago, that the natural flow of the main river, both spring and fall, was inadequate to supply the large volume of water required. They joined forces and made application for a number of reservoir sites, and had already begun construction on some of these and only awaited the action of the department granting them a right of way, to begin on the others. Their irrigation system was almost free from indebtedness and was wholly owned and controlled by the resident landowners. The annual water rates were not as great per year as is charged by the month or even by the day in many parts of California.

At this juncture the Reclamation Service came into the field, and after doing a little investigating, laid before these people a plan whereby the government would take over their reservoirs, impound all the flood waters and winter flow; give to each appropriator and canal such volume as their measurements would show they were entitled to, and provide all additional water required at the regular government rates. This proposition was submitted to the citizens in the form of a petition and signed by nearly ninety percent of them. They turned over to the Service all of their reservoirs without compensation on the promise of the officials to restore them in case they were not needed. It is stated that the officials also agreed to allow the applicants the use of the field notes and maps for all reservoirs not required in the government project.

Among the reservoirs thus turned over to the Service was one having a capacity of 100,000 acre feet which could be filled twice each season, making available 200,000 acre feet of water. At the request of the citizens, and the applicants who filed in their behalf, this site was tendered to the service directly in Washington by Mr. Newlands. At the request of the citizens Mr. Leon H. Taylor, engineer in charge of the Truckee-Carson project, was sent to investigate this proposed reservoir. His report showed that it was feasible; that it would not cost to exceed $300,000; that a large volume of water would have been available in six months, and that construction could proceed without affecting its use continually; and that with the use of the river at flood stage it would be possible to reclaim nearly half the body of lands included within the project previously investigated by the service, and that the cost would not exceed $6.50 per acre for both reservoir and the ditches necessary to put it upon the land.

The Act of April 16, 1906 (Public No. 103), amendatory of the Reclamation Act (Sec. 4), reads as follows:

"That the Secretary of the Interior shall, in accordance with the provisions of the Reclamation Act, provide for water rights in amounts he may deem necessary, for the towns established as herein provided . . . and other towns or cities on or in the immediate vicinity of irrigation projects, which shall have a water right from the same source as that of said project for the delivery of such water to some convenient point, and for the payment into the Reclamation fund of charges of the same to be paid by such towns or cities . . . ." Section 5 of said Act provides for the retaining of sites for power plants on any reclamation project, and authorizes the service to construct such plants for use in the development of water by pumping, etc.

The citizens, by petition filed in June, 1907, just prior to Secretary Garfield's trip to the west, acceded

to the needs of the city, supposing that the department would be enabled by the terms of this Act to make such provision as was deemed equitable and necessary. Such an appropriation of water under the Reclamation Project, and under this Act, would have given the city all of the water which the Secretary deemed necessary for domestic and municipal purposes, and would have been a complete bar to all future encroachments—leaving the Owens River Valley people absolutely protected and free to proceed with their own development.

The Act of June 30, 1906, in favor of Los Angeles, makes specific provision in Section 3 that all legitimate rights both in land and in ditches, reservoirs and water appropriations shall be protected.

The Reclamation Act of June 17, 1902, makes specific provision that the government stands upon the same basis as an individual in the appropriation of water, and must take it subject to the state law. The Forest Act passed by Congress makes provision that the citizens of the state shall have the right to enter upon said reservations for the appropriation of water under the state laws.

Notwithstanding these and numerous decisions of the courts, and the rules and regulations of the departments regarding the use of rights of way for ditches and reservoirs, not a single reply or even an acknowledgement has been received by these people to their various petitions praying for a hearing to determine their rights. The individuals who filed on the reservoir sites, the associated ditches, the Chamber of Commerce, and the Board of Supervisors of Inyo County, have addressed numerous petitions both to the Secretary of the Interior and the Secretary of Agriculture, to none of which has there been a reply; no relief granted for which the petitions prayed, no hearing granted, the citizens being left in utter ignorance of how to protect their rights.

Who is to blame for this condition? Will some government official explain.

Interfere With Reclamation Service.

Certain citizens of Colorado have announced their purpose to test in the Federal courts the power of the Secretary of the Interior to refuse the grant of rights of way over public lands for irrigation canals, on the ground that to do so "will interfere with the plans of the Reclamation Service."

The particular contention is based upon the following facts alleged. Surveys and maps were made and filed with an application as required by the statutes of Colorado, for a canal to divert water from the Grand River in the western part of that state. A small portion of the right of way needed crossed sundry vacant government lands in the canyon, necessitating the approval of the Secretary of the Interior as prescribed by the rules of the department.

After a delay of nearly a year this application was rejected on the grounds, solely, that the plans of the Reclamation Service might be interfered with. No opportunity was given the applicant to be heard, although it is claimed that in no particular, as a matter of fact, does the private project affect the other. It is from this arbitrary decision that steps are taking to appeal to the courts for redress.

Five or six years previously the Reclamation Service ran several preliminary lines with a view to ultimately constructing a canal to cover certain lands in that section, one-half still vacant and the balance patented, which were at the outset withdrawn from entry. For several years thereafter the government took no further steps or apparent interest in the project.

Then an Irrigation District was organized, surveys made, and bonds voted for the purpose of supplying practically the same territory, but the government refused to restore the public lands and finally openly displayed its opposition to all local initiative. Whenever the efforts of private endeavor were renewed agents of the Reclamation Service would reappear and by one means or another harry and defeat local progress.

When the right of way intended for the use of the District territory was rejected as aforesaid, not a yard of earth had been moved, no application to the state authorities for right to divert water had been filed, nor the final location of the canal line been determined upon by the Reclamation Service. This condition of affairs continues to this day, although tens of thousands of dollars of the reclamation fund have been exhausted in "preliminary" investigations.

But because it is proposed when funds are available, admittedly some years hence, such a canal may be constructed, the effort of private capital meantime to develop that section is defeated by this ruling of the Secretary of the Interior, made repeatedly in other instances, that such an effort would "interfere with the plans of the Reclamation Service!"

Invariably this ruling has effectually blocked local operations because capital cannot be enlisted for construction where it must face a test with the general government over rights of way.

In addition to the question whether the state control of the waters of its public streams can be defeated in this way and the right of its citizens guaranteed by the constitution of Colorado to divert such waters be denied, it is probable also that the very constitutionality of the Reclamation Act itself will be attacked in this suit.

Another phase of the autocratic methods employed by the Secretary of the Interior in conjunction with

the Reclamation Service is illustrated by the following performance:

Just across the southern border of Colorado, in New Mexico, is the Red River, a tributary of the Rio Grande. The stream flows from a canyon and is cut deep below the adjacent tablelands, consequently practically no diversion of its waters for irrigating, on account of the great expense involved, has ever been made. One of the adjacent mesas covering about 40,000 acres was selected by the territory in its allotment of public lands granted by Congress for internal improvements, etc. A couple of years ago a syndicate of Denver capitalists secured an option for this tract from the New Mexico authorities on terms favorable to all concerned, subject to the report of their engineers. After an outlay of several thousand dollars a canal line was finally located and maps of the survey and an application were filed with the territorial engineer, as required by the statute.

The line adopted in the canyon ran across a few miles of public lands, worthless for any other purpose. Application was made to the Secretary of the Interior for the right of way. After some months' delay this was rejected on the ground that "it would interfere with the plans of the Reclamation Service," which has announced its intention to build a dam across the Rio Grande River, not far from El Paso, several hundred miles below, to impound flood waters for the use of private lands in Old Mexico and Texas. After a loss of several months' more time, and at a considerable additional expense for agents and attorneys employed to solicit the authorities at Washington, nothing was accomplished. The Governor of New Mexico became enlisted and finally, through his personal efforts, the right of way was secured, the territory threatening to give back the tract to the government as worthless if so prevented by the Secretary of the Interior from getting water for it.

This transaction began and terminated long since other private capital on the head waters of the same Rio Grande river, in the San Luis Valley of the Colorado, has for years tried to obtain other similar rights of way for supplemental irrigation, only to have their applications refused, because if granted they also "would interfere with the plans of the Reclamation Service, proposing to carry out the El Paso project."

It remains to be seen if the people of Colorado will submit to this plain outrage upon their rights.

$2.50 Will pay for the IRRIGATION AGE one year and the PRIMER OF IRRIGATION.

EDITORIAL NOTES.

BY G. L. SHUMWAY.

Executive Chairman American Irrigation Federation.

One of the difficulties agitating water users under Federal irrigation projects is: "Shall the government charge for 'betterments' and 'maintenance,' after having announced the estimated cost of the project, and permitted settlement?"

The Executive Committee of the American Irrigation Federation is of negative opinion. It would seem that the published estimate, and the law which says, "The estimated cost shall be the cost," was meant to settle that question. At any rate there is an implied contract, as well as verbal one from the field engineers, which should not be violated, especially from the paternal side.

It seems inconceivable and unrighteous that a government should compel its home builders to pay for the errors of its bureaus and engineers. It is probable that no censure should rest upon any one for these errors, for the sudden growth of the reclamation service called into it a great number of inexperienced individnals. That, however, should not inspire the government to put the burden upon the shoulders of the home builders.

This attitude on the part of the reclamation officials, in refusing to acknowledge their human propensity to err, will only engender a bitterness and an antipathy between the home makers, and the government that can do no one any good. It would be a mistaken policy on the part of the government to try to drive these present occupants off the land, and it would have that effect, if these unreasonable charges are insisted upon.

To be sure, there is in most water users' districts a sort of a contract with the Secretar yof the Interior, that says the association members agree to pay maintenance, etc., but this contract was, I am sure, endorsed at the solicitation and, I may say, determination, of the Federal officials, and was hardly understood by those who voted affirmatively thereon. I mentioned the fact at the time through these columns, and spoke of the "love-feast," where those who did not understand had not participated.

One of the ridiculous provisions of this contract is that the Secretary of the Interior has absolute authority to alter and amend his part of the contract at will. On the other hand, the water users are solemnly bound. Even the inferior lawyers in the service should know that such a contract is void, but I would not expect

Morris Bein to make that acknowledgment. I have been sorely disappointed in Mr. Bein. His loooks suggest greater knowledge than his actions indicate.

At any rate the time is here when the crisis in the lives of many who have been lured by the hope that the government wanted its lands occupied by homes, and it's up to the administration of the affairs of the service to do or not to do. If they decide on the latter it involves appeals to congress and legal troubles galore.

The Stockgrowers' convention recently held at Denver has again denounced the Pinchot policy. The east should take notice that the west does not want this bar to its progress. The new Governor of Colorado, Honest John Shafroth, the new United States Senator from Colorado, Hon. Chas. Hughes, are each the result of the western spirit which is against the Pinchot policies.

And just as we had begun to think that Secretary Garfield had some ideas independent of the king of the Tennis Cabinet, he comes out with a silly request for an enormous sum to prosecute land thieves. The sum he asks for would buy today practically all of the land that has been obtained through the administration of those laws, where any question might be raised. The great land steals of the country are untouched by the administration.

Really and truly, in summing up the whole line of prosecution instituted by the Federal government for violations of Federal laws, we find in the jails and penitentiaries only a few so-called land thieves who were too poor to battle with the might of the whole United States. Perhaps the few convictions made and the fact that they were the only ones of consequence, is the reason behind this proposal to carry on the farce.

One of the peculiarities of the persecution has been that those who to all appearances are the guiltiest in the way of these so-called frauds have a way of obtaining immunity. One of the most popular of western senators with the administration at Washington—one who is counselling with the President oftener than any other—has never been touched. Yet it is claimed that cowboys, carmen and women acquired through homestead and desert land acts some 50,000 acres of land that was turned over immediately to a large cattle company in which he was interested. We are curious to know how he has escaped the Federal sleuths.

Send $2.50 for The Irrigation Age 1 year, and The Primer of Irrigation

SEVENTEENTH NATIONAL CONGRESS

To Be Held at Spokane, Washington, Aug. 9, 14, 1909.

BY AUGUST WOLF

Advantages of community life in localities where the soil is cultivated in the most intelligent manner possible and where orchards and fields are watered by scientific means will be brought prominently to the fore at the sessions of the 17th National Irrigation Congress in Spokane, August 9 to 14, under the presidency of George E. Barstow of Barstow, Texas. It is expected there will be between 4,000 and 5,000 accredited delegates.

Arthur Hooker, secretary of the local board of control, of which R. Insinger is chairman, has advices that large delegations will come from Texas, Colorado, California, Idaho, Montana, Washington, Utah, Nevada, Wyoming, Arizona, Oklahoma, New Mexico, also that Kansas, Nebraska, Iowa, the Dakotas, Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, New York, Pennsylvania and states in the south and New England will have representatives. Massachusetts, Vermont, New Hampshire, Rhode Island, Maine and Maryland will have special delegates.

Possibilities under intensive cultivation will be demonstrated and among the other prominent subjects for discussion will be the reclamation of swamp and arid lands, conservation of water, preservation and rehabilitation of timber areas, deep waterways, good roads, drainage and home-building. These matters will be discussed by federal officers, scientists, railway officials and foreign representatives.

The delegates to the National Irrigation Congress will have the privilege of participating at the formal opening of the Spokane Coliseum, to be erected by the National Apple Show, Inc., of which Louis W. Hill of St. Paul, president of the Great Northern Railway Company, is the head. The hall will be the largest west of the Rocky Mountains and will accommodate from 15,000 to 20,000 persons. The structure will be of steel and reinforced concrete, and is to be ready in time for the congress.

Preliminary plans already made provide for a reception by the people of Spokane and the Inland Empire in honor of the delegates and visitors. This will be during the opening day. Another feature will be an industrial parade, with floats representing the business houses, affording also opportunities for the various districts in the irrigated areas of the west to display their products and other means of showing the progress made in the communities.

It is also planned to have a military parade, in which companies of United States soldiers and state militia will participate, and another pageant will be a march in review by civic and fraternal organizations. In this it is purposed to have several hundred representatives of Indian tribes, mounted and garbed in festalday raiment, also squaws and pappooses.

The crowning feature of the street demonstrations, however, will be the parade of the Irrigation Army, to be marshaled from the irrigated belts of the Pacific and western and southwestern states. The marchers will wear distinctive uniforms, with caps and banners

bearing the names of the districts represented. There will be a trophy cup for the company making the best showing. It is expected to organize marching clubs in at least 150 communities in these states, so that from 10,000 to 12,000 men will be in line. Most of the clubs will be accompanied by bands, which will be massed at the close of the parade.

A chorus of 1,000 voices will be organized early next spring to sing the Irrigation Ode at the opening of the Congress. The singers will be drilled once a week in the state armory. Other features are also being considered by the executive committee. The board of governors, of which W. A. Beard of Sacramento, Cal., is chairman, will have charge of the final arrangements of the program. These have not yet been worked out, but it may be said at this time that in addition to the addresses and speeches there will be banquets, theater parties and side trips to the lake and river resorts and fruit belts in various parts of the Inland Empire.

The practical side of the congress will include demonstrations of the methods by which moisture is scientifically applied to lands in the Inland Empire. This will be shown in the Spokane valley, where pumping and gravity systems are employed. The demonstrators will be from the agricultural department at Washington, D. C., and state colleges and experimental stations. There will be excursions to the fruit belts in the Yakima, Wenatches, Okanogan and Colville valleys so that one or more of the sessions can take place in the vicinity of the big irrigation plants operated by the federal government and private companies.

Another excursion is to be to the Coeur d'Alene reservation, east of Spokane, which contains the largest stand of white pine timber left intact on this continent. Practical reforestry and means of fighting forest fires will be demonstrated there, while in the northern part of the district opportunity will be afforded to study the reclamation of swamp lands. Aided by federal and state appropriations the local board of control will have ample funds to provide for what gives every promise of being the most successful congress in the history of the organization.

BLUEWATER VALLEY
NEW MEXICO

BY OLANDER.

Plowing and ditching is still going on—the weather has been open and everyone is getting ready for the spring seeding.

The Bluewater Development Company is setting out the first orchard planted in the valley. The varieties of apples are Winesap, Spitzbergen, Jonathan, Rome Beauty, Winter Banana, Delicious and Ben Davis. They are also planting the Oxheart and Lambert cherries, currants, raspberries and gooseberries, plums and pears. The fruits which will be raised here will undoubtedly have a beautiful color on account of the presence of such a large quantity of oxide of iron in the soil.

It gives the settler such a comfortable feeling to know that he can go to work at once on his land here, making partial payments on the purchase price and not have excessive interest accruing on the back payments. Most of us will have our land paid for before the contracts commence to bear interest at all. We have no interest, no maintenance charge for water, and no taxes to pay for three years after purchasing. If the contract runs more than three years, the interest rate is only six per cent.

The Bluewater Company, we are informed, is also agreeing in its contracts to refund to the estate of any purchaser who may die before making final payment on his land all the money which the purchaser has paid upon his contract, if his heirs so desire. This provision assures the purchaser that he can not lose the money he pays on his land—if he lives his efforts on the land will greatly increase its value and if he should die his family can have the money back if they so desire.

Mr. Walker will plant a large acreage of celery. Judging from the numbers of settlers who are going to plant celery, "Bluewater Celery" should become well known on the market. It will be the aim of all those who plant celery to produce a superior quality.

As a stock feeding community, Bluewater valley, probably excels any other. The advantage of a main line railroad, high priced market to which to ship, at Los Angeles, irrigated lands in the valley on which to raise winter feed and above all the immense area of grazing lands surrounding the valley, which can never be farmed on account of their configuration, and also the smaller loss because of a mild climate make the Bluewater Valley a splendid location for stock raisers and feeders. A large proportion of the Colorado feeding lambs are purchased at Grant's, in the lower Bluewater Valley, shipped to Colorado, unloaded, fed and reshipped to distant markets at a profit. If this feeding were done at Bluewater, think of the saving in freight, the smaller loss in shipping, the smaller climate loss, etc. Then, too, Los Angeles is a much higher priced market than Denver, Omaha, Kansas City or Chicago.

Wild grasses four feet in length have been cut on the grazing area at Bluewater, and with such conditions it will be but a short time until the valley is settled with a community of small stock farmers.

Alfalfa in the Bluewater Valley, New Mexico.

WATER RIGHTS IN THE BUHL COUNTRY.

By Taylor.

The most important legal right in an irrigated country is a perfect water right for irrigation purposes, and the most valuable property that can be owned in such a country is a perfect, perpetual, inalienable water right.

When it is remembered that irrigated lands produce more abundantly, and a far better quality of crops than any other kind of lands and that, ordinarily, there can be no such thing as a crop failure, it is readily seen how difficult it is to estimate the real value of a good water right.

The water rights in the Buhl country, embracing 150,000 acres of the finest land on the globe, in the center of which is located the progressive and rapidly growing town of Buhl, are the best water rights that can be acquired under any law yet made. Every step required by the laws of the United States and the state as well, in order to acquire and establish a perfect, perpetual and inalienable water right for the irrigation of the lands of the Buhl country, has been taken, from the posting of the notice of appropriation at the point of diversion to the full completion of the works and canal systems by which the water is conducted on and applied to the land, and the application of the water to the land.

The water right in the Buhl country attaches to and becomes appurtenant to the land the moment the title passes from the United States government to the state of Idaho, or to an individual under the Cary act, and remains

The Milner Dam Across Snake River Source of Water Supply for the Country Around Buhl, Idaho.

thereafter and forever an inalienable appurtenant to the land.

The next thing in importance to the water right itself is the priority right to use of the water. In this respect the Buhl country occupies an enviable position, for it has a priority water right over all the other great irrigation projects in the state of Idaho, taking their water from the Snake river. It has priority No. 1. The value of this priority right is inestimable and cannot be fully appreciated by any but those who live in irrigated countries.

No one familiar with the conditions existing in the Buhl country and the immense volume of water carried by the Snake river, together with the numerous reservoirs in course of construction and in contemplation for the conservation of the waters of the river until needed entertains the slightest fear of a scarcity of water ever occurring in the Snake river valley, but if, possibly, the Buhl country would not suffer the loss of a single drop to which it is entitled, for, as said above, it has priority No. 1, and therefore must receive all its water before any of the other projects could get any at all. This fact should be borne in mind by persons intending to invest in land or town property on any of the various Cary act projects now under way in the state of Idaho.

Anyone wishing further information, write to the following firms: Buhl Investment Company, Shank & Wilkinson, Idaho Realty Company, Monahan & Kerley, Buhl Land Company.

The Art of Irrigation

Chapter Nine

By T. S. Van Dyke

When you look at your fine streams a few hours after starting them you may find half or more of them stopped with the rest carrying all the water. You may have discovered before that you can not carry all your knowledge on your finger's ends. That you could not think of it all at once is no fault of the system. You very naturally tried to take a lot of small streams out of the side of a ditch. Had it been a larger ditch it would have cut out some of the openings and flooded the whole place. But even with a small one you cannot safely take out water if it is running on a slope sufficient to give it a reasonable velocity. You may fix it so as to prevent cutting but it will not feed the furrows with uniformity. You must take out the head into a smaller ditch alongside of it so as to keep the surface level. This ditch must have no more flow than is needed to feed the furrows. It must not be too long or the level necessary to give uniformity will be lost. It must generally be a series of levels if streams are to be taken out by running furrows into it.

You do all this and soon come to grief again. Some of the streams soon become too small to run through the tract. Same old story—you did not stop to think about it. On almost any light, loose soil the smallest streams are liable to cut in one place and fill in another. If the main stream carries silt the building bars at the mouth of some of the furrows is certain, either stopping, or reducing, the flow; while others cut out more at the head under the increased pressure brought on the second ditch by the stoppage of the others. This second ditch is sometimes called the "head ditch" to distinguish it from the main ditch or canal, but for many furrows you must have something harder than earth to regulate the flow into them. Coarse, gravelly ground and tough clays of some kinds permit quite a number of streams sometimes but it is not well to rely on them or you may pay for it later on. I have run as high as forty at once on very gravelly ground without any regulators and I have good soil where I can not trust even four. So it is best to put in something at the start unless you have ground unusually tough, when, for small garden work, you cannot lose much time chasing after them.

It is common to regulate the flow with straw, weeds, rags, brickbats and all sorts of things. This is recognizing the difficultv and resorting to the stupidest way of avoiding it. The failure to do this properly and using all sorts of makeshifts to save a few dollars has been a prolific source of failure to realize the best results and has cost in the end many times what has been saved. Bags half filled with earth are the best makeshift, because there is slight danger of the water getting behind them if not too full and if properly tamped down. But they are far inferior to wood, iron or concrete properly fixed. In many cases four laths nailed together make a square conduit which is cheap and quite effective. These are often placed in the bank of a main ditch if not too large without the intervention of a second ditch or "head ditch." But

then they must generally be closed when not used, whereas if put in a second ditch they can be left open until the next time. They can be put on a level and the level of the water raised by a gate below, but this costs some cleaning if the water carries much rubbish.

All kinds of small gates are in use at the heads of the rows, but Riverside, Cal., was the first to discover years ago that by far the cheapest in the end was to lay a flume all the way along the upper side of the orchard. This was first made of redwood with an opening of about an inch every three feet or so. This was closed with a button of wood and later with a slide of zinc set in a strip of sheet zinc. These openings once set for the right quantity of water were left so for the next irrigation when the necessary head was turned in and little remained but to turn in the proper head of water. If the flume had cracked from drying a few shovels full of earth soon made it tight enough. These flumes were set in the ground, or on the ground, as most convenient and sometimes were on blocks. The irrigation became such easy work that mere boys could do it and many a retired business man from the east, crippled with age or infirmity, took care of ten acres of oranges and raised a large crop of fine fruit alone, though having abundant means. For it became a good way to pass idle time, became something of a fashion, and equalled banking in commanding the respect of those accustomed to sneer at any business outside of a large city.

The furrows were made at first with a small corn plow. But this made them most too large in spite of a wheel in front. The cultivator with a furrowing blade came next, then the riding cultivator and, as perfection of grading was reached, a riding cultivator with three furrowers was used, so that three furrows were made at once, all of them ready to turn the water into with a few strokes of the hoe at the upper end. Possibly an upturned stone or root might stop one of them, and if it did the grading was so perfect that the trouble could be readily seen from the upper side. The irrigator looked at it perhaps once a day for two or three days, possibly four altogether, depending on the texture of the soil. At the end of that time the ground was in the same condition as if it had had from three to five inches of rain falling softly for three or four days—the amount thus put in depending largely on the age of the trees, the size of the crop, the character of the soil and somewhat on the whim of the irrigator or on his desire to experiment, which nearly every one was doing. It was the constant experimenting by people of means who came to Southern California to enjoy its climate that brought irrigation to the highest perfection reached on earth. I do not say this because I live here, but I live here because that is true. It was the dryness of the climate and the scarcity of rainfall that caused all this experimenting. There were so many well to do people coming every year, determined to stay whether they could raise anything or not. Most of them wanted to live out of town and have a nice place. Had water been as abundant as it was in the north they would probably have made the same muss with it that so many did in the great San Joaquin Valley. But water was scarce, woefully scarce, and the cheapest way to get it was to save it. There was a sharp limit on the wildest efforts of the millionaire to turn his money into water, and nothing to do but eke out the last drop like shipwrecked mariners.

Haying Scene in the Pecos Valley, New Mexico.

It was the anxiety to save water that led to putting in flumes. Even the slight leakage from these was too great and they were coated with asphaltum. Even this cracked too much at times and cement con-

duits of about the same size and form began to take their place. A machine laid these in a continuous strip, little gates of galvanized iron at about every three feet were imbedded in them; it cost ten to fifteen dollars an acre, but it was well worth it. Evaporation from the surface of water is of very little consequence on any aqueduct, but many thought that it would pay to save even this. So concrete pipes laid under ground with small pipes rising above the surface to feed the furrows came into use. Some iron pipes were fed from stop cocks under pressure and were all right but for the possibility of the head fluctuating from supplying other consumers at the same time. A head measured into a

Mr. H. L. Hollister, One of the Active Forces in the Twin Falls, Idaho, Development.

pipe flowing by local gravity only, without pressure from any other source, will not fluctuate much.

The number of furrows varied from five to seven between two rows of trees, but six about a yard apart made with two trips of a cultivator are about right. If you can't make three at once with such a cultivator comb the ground down until you can instead of rejecting the cultivator. From the effects of early flooding it was plain that trees were injured by water touching the trunks, or rather standing there a few hours. It was noticed first with oranges, but other trees showed something of the same effect. The trial of the small furrow system soon showed that the early view was correct. Nowadays the water is not allowed to come nearer than two feet and generally three or over. One furrow was run beside a tree one year old, two for the next and so on, coaxing the roots out into the warm, rich top soil, but many put in all the furrows for the young trees so as to get the roots out as far as possible at the earliest moment.

The regulation of the feed from these flumes is primarily by the gates, which are always left in position for the next irrigation. But when water begins to run low in them the water is raised by brickbats or cleats or something of the sort. The small discharge holes are apt to clog with leaves and rubbish at first and the best way to avoid that is a bit of curved pipe four or five inches long inserted in the bottom of the side and well below the water level, which should be kept high purposely. When this pipe is turned so that the lower end is toward the ground the discharge is free and almost any rubbish is carried through by the pressure. When it is turned half around so that the outer end is upward it is above the water level inside and there is no discharge or inducement for floating leaves, etc., to enter.

When the ground is dry enough cultivation is at once begun and continued in the best orchards without intermission until the trees need water again. As soon as the cultivator has finished going one way it is started the other way, so that the top soil is kept like meal all summer and is in perfect shape to furrow when the time comes for the next irrigation. Some have tried running a subsoil plow beneath these furrows so that very little of the water shows above ground and less wets the extreme top from which it is lost by direct evaporation without reaching the roots. This works well on some soils, though on others its utility is not obvious. It is more a question of how much the roots may be cut without injuring the tree too much. Some never plow the orchard at all after the trees reach fair size, others plow very shallow, most others depend entirely on the cultivator, which is rarely run over five inches deep. Where you find differences of opinion on these points it is more a difference of soils or age of trees than anything else.

One would suppose that the upper side of an orchard would show better results than the lower, because it gets water so much longer. But such results are not apparent in a run of two or three days, though the upper side must get more than the lower. To insure thorough wetting of the lower ends of the furrows a little is allowed to run over. But in many orchards the work is so fine that this waste is practically nothing. In other cases a small patch of alfalfa or something that needs little care is planted to take up the waste.

This system has been studied by experts from different parts of the west and is being adopted everywhere for fine fruit culture. What modifications there are are only in the line of economy and do not affect the principles which are simply:

First—That a small stream running a long time does better work than anything that presses down the soil or makes it muddy.

Second—That such streams need not be nearer than three feet apart on soils that are really suitable for fruit.

Third—That such streams cannot be run in any number without artificial regulators at the heads and that in the end the very best regulators are the cheapest in time and labor.

Fourth—That cultivation is almost as important as the water and should be incessant without regard to the amount of moisture in the soil or the entire absence of seeds or grass. Aeration of the ground is now proved one of the advantages and such a great one that for that alone cultivation should be continuous.

This method can be used for anything, but alfalfa, grain and some other things so choke the furrows after getting a good growth that the water breaks out of them and a larger head must be forced on so as to get through quickly enough. This is practically flooding, but has the advantage of starting crops without flooding and keeping them going to the point where they are strong enough to endure it. Where the formation of the air spaces in dry air and hot sun or heavy winds does not require the sealing of the surface, as before explained, or where it is not a question of immediate economy, almost everything is better started this way. Especially is this true of all orchard and garden work. But where vegetation clogs the furrows the ground should be laid out in narrow lands, say ten feet wide. In these two, three or four furrows, according to the crop, should be run and the seed planted in the dry ground several inches from the furrow. The water should then be run long enough to wet them until they sprout, when there is little more trouble. In this way crops can be started on a slope so steep that the ground would cut if a sheet of water were run down the land while it was bare of vegetation. Cultivation with the wheel hoe, cultivator, or corn plow, can be carried on without difficulty for most crops. But for stuff like melons that will cover the ground and clog the furrows with the fruit a larger head must be forced through and if not held in place by levees on the sides the water may split and part go where it already has enough and another part go where it is not needed. With a little care stuff like corn, potatoes, etc., can be irrigated to maturity by the furrows and well cultivated all the time.

This small furrow system has now been tried so long that it is entirely too late to question it and it is doubtful if it can be improved any further. It is practically gentle rain on tap. This combined with sunshine on top, as in the arid lands, makes the finest cultivation on earth. Any one intending to go into irrigation on any considerable scale should come first of all to Southern California and see what poverty in water has compelled wealth to discover.

IRRIGATION IN WASHINGTON.

AUGUST WOLF.

Crop returns ranging from $1,000 to $3,000 an acre in a number of instances in the Sunnyside irrigated district are reported by Frederick H. Newell, director of the United States reclamation service, in his report dealing with the development of the various government projects in the State of Washington.

The main canal and diversion dam of the Sunnyside project, southwest of Spokane, were completed early in 1907, and satisfactory progress has been made with the less important work. In addition to providing for the adequate irrigation of this land steps have been taken to install a drainage system to counteract the effects of over-irrigation in the low lands.

In January surveys were made of the Mabton division of this project, which contemplates irrigating 9,000 acres of land on the south side of Yakima river, and this work is now being pushed by the government under force account.

Regarding the development under the Sunnyside canal, Mr. Newell writes as follows:

"The major portion of the settlement and development of the Sunnyside project has occurred within the past eight years, and more particularly since the property was purchased by the United States. There are on the project now over 17,000 people, five prosperous towns, four flourishing banking institutions, many substantial business houses and numerous schools and churches. During the past year there has been an increase of about 3,000 in the population. The size of the average farm is about 30 acres, with a tendency toward a smaller unit. The project produces livestock and dairy products and a large range of crops, such as fruits, alfalfa, timothy, clover, potatoes and other vegetables. Canning factories were built at Granger and Sunnyside during the past year, and others are projected at Zillah, Parker, Grandview, the soil being well adapted to the production of asparagus, tomatoes, sweet corn and other vegetables suitable for canning.

"The Sunnyside canal and the lateral system have been successfully operated during the irrigation seasons of the fiscal year, without breaks or serious mishaps of any kind and with satisfactory delivery of water to the water users. The area of land receiving water during 1907 was approximately 40,000 acres, and the irrigated area on June 30, 1908, was approximately 43,000 acres.

"When the Sunnyside property was taken over by the United States it was found to be in a very poor state of repair, nothing having been done along betterment lines by the irrigation company for several years previously. The property is now in a good state of repair and in a serviceable operating condition.

"Some of the crop returns of the Sunnyside district were phenomenal during 1907, ranging from $1,000 to $3,000 an acre in a number of instances. It should be stated, however, that these returns are exceptional. The total irrigated area, aggregating 40,000 acres, produced crops of a value of more than $2,000,000, an average of over $50 an acre. It might be said in explanation that the average return yield per acre of the land was considerably more than the figure named, as a large portion of the irrigated area was planted in new orchards and grasses, such as alfalfa, timothy and clover."

The Tieton project was 34 per cent completed on June 30. As on the Sunnyside, the government was compelled to do much of the work by day labor because of the inability to secure satisfactory bids. Three tunnels are being built in connection with this project, with a total length of 9,662 feet; and these tunnels form one of the most expensive features of the system, as they are being lined with concrete to prevent erosion. The delays that have occurred because of the failure to make satisfactory contracts will probably make it necessary to postpone the delivery of water under the Tieton project until 1910.

To further the irrigation of lands in Yakima valley the reclamation service has built temporary dams at the outlets of Lake Cle Elum, Keechelus and Kachess. Permanent dams are to be built in the future, but the temporary dams will permit of the emptying of sufficient water to keep up a continuous supply sufficient to meet present demands.

The Okanogan project was 35 per cent completed on July 1, 1908. The report adds:

"The delivery of flood water during the season of 1908 has gone far toward showing that the project will be a success. Flood waters were delivered during June and a few days in July. A great number of young orchards have been planted and are doing splendidly on the flood waters. The lands under this project are first-class fruit lands and will undoubtedly pay a handsome profit after paying the cost of the irrigation works.

"Plans have been considered by the Office of Indian Affairs for the incorporation of the present irrigation system on the Yakima Indian reservation, on the Yakima river, near North Yakima, Washington, into the Wapato project of the present system in use by the Indians, authorized by the act of Congress, approved March 6, 1906, providing for repayment from Indian funds of proportionate reclamation service.

POWER IRRIGATION

By E. C. Reybold, Jr.

There are probably more gasoline engines used for pumping water for irrigating purposes than any other style of motive power. This is because of the cheapness and facility with which small plants may be installed, their relatively small cost of operation, the trifling amount of attention required, and the small weight of fuel to be transported. When anyone needs a small amount of power intermittently nothing save electric power can excel a gasoline engine, for if it is kept in good condition it can be started within a minute, making a gain of about an hour over the use of a steam engine and boiler. Of course, electric power is even better than a gasoline engine, as when the switch is closed the motor starts, but as comparatively few farmers have electric power the gasoline engine finds great favor.

Typical Ranch Home in the Mesilla Valley, New Mexico.

Although such an engine is the best friend the farmer can have, it is lamentable to consider the troubles and difficulties that many have with them. When properly selected and cared for they will give but little trouble, as is evident from the large number of plants that have been in operation for many years with but little expense for repairs. We know of some engines that have been doing hard work for twenty years, and others for ten and fifteen. We do not like to find fault with our friends, the farmers, but we want to simply suggest that if they would only give more attention to their engines, treating them as they would horses that cost as much money (if such were possible), most of these difficulties would disappear. If horses were treated as badly the Society for Prevention of Cruelty to Animals would intervene, but there is no such society to protect engines. A new engine is purchased for several hundred dollars, and worked hard all summer. It requires so little attention during the first year that it gets less than it ought to have. Fall comes and there is only occasional need for the engine, but it is kept ready for work at all times, with the circulating tank full of water. Along comes a night a little colder than usual, and the water in the jacket freezes, resulting in a cracked jacket. In a very large percentage of gasoline engines the jackets are cracked before the first winter is over. The damage is not as a usual thing serious, but it costs something to have them banded and made water tight, and when the engine returns from the hospital with a bandage around its cylinder it has already been given a good start toward the junk pile. Now this is utterly uncalled for. We know that "it was not cold enough to freeze anything" (it never is when a jacket is cracked), but such excuses don't go, and you simply want to take the hint and let all of the water out of your cylinder every night when fall approaches. Such neglect makes work for the repair men, and expense for the farmer, incidentally giving a hard knock to gasoline engines in general, and there is no excuse for it.

When about to purchase an engine remember that you are to buy a piece of machinery that will cost more than a good horse, and that there are good engines and poor engines, just as there are good horses and poor horses. Don't buy the cheapest engine that you can, any more than you would buy the cheapest horse, as the cost price is not everything by any means. It will usually be found that the cheapest engines run at very high speeds, and although the engines used in automobiles are of this nature, it is not probable that you will be able to run your engine into a garage every night to be looked over, cleaned and adjusted by mechanics before you will start it next morning. The higher the speed of machinery the less the cost, as there is less material required in the construction, but

it will usually be found that the cost of repairs is about in proportion to the speed.

Nearly all engines on the market are four-cycle, but there are a few two-cycle, meaning four strokes or two strokes respectively, per cycle of operation. A cycle means the interval of time between explosions, and you will notice that four strokes, or two revolutions, are required for each explosion in most engines, while in some there is an explosion every revolution. In a four-cycle engine the first stroke draws in the gasoline, the next (back) compresses the mixture of gasoline and air ready for ignition at the back end; the third stroke is just after the explosion, and the fourth (back) serves to expel the gases of the explosion. In two-cycle engines the forward stroke following the explosion is the first, a combination of ports being so arranged that the exploded gases pass out at the end of the stroke, the new mixture of gasoline and air being quickly forced into the cylinder, compressed on the back stroke and ignited. Some two-cycle engines give very good results, although it can scarcely be claimed that they will operate with as little fuel as a four-cycle engine, since it is evident that some portions of the exploded gases will remain in the cylinder after the new mixture enters, even though the incoming mixture forces out some remnants of the exploded gases left in the cylinder. Two-cycle engines give an explosion at every revolution, and thus more power is secured from a cylinder of certain size than from a four-cycle engine. It is, therefore, evident that a two-cycle engine can be bought for less money than a four-cycle, as less metal is required to build it, but the cost of operation and the amount of fuel used will be more. Probably ninety-five percent of all gasoline engines on the market are four-cycle. It is seldom that a good gasoline engine of size below 25 H. P. can be bought for less than $35 or $40 per horsepower.

EFFECT OF ALTITUDE.

Since a gasoline engine cannot give its full quota of power at an altitude greater than that at which it was made and tested, it is necessary to make proper allowances for this loss of power, which is equal to about three percent for each one thousand feet of altitude. At five thousand feet altitude, a 10 H. P. engine will give about 8½ H. P., while at ten thousand feet it will give but 7 H. P. This loss is occasioned by the decreased atmospheric pressure, which prevents the engine from getting as much active air in its cylinder at a high altitude as it does at sea level. It gets a cylinder full, but there is less oxygen in it, and it is the oxygen that combines with the gasoline to make the explosion.

FUEL CONSUMPTION.

An engine of 10 H. P. or more will give one horsepower for ten hours with one gallon of gasoline, while with the sizes below 10 H. P. between 1 and 1-¼ gallons will be required. Distillate or alcohol can be used in most engines, without any change, the quantity required being about the same as for gasoline. If fuel must be hauled very far the advantages of a gasoline engine are plainly shown when compared with steam. One pound of gasoline will give one horsepower for an hour, but with a steam engine from five to eight pounds of fuel are required. It must also be remembered that when a boiler and engine are used, fuel is consumed in getting up steam for about an hour before work can be commenced, and that after the engine is shut down there is always a great deal of coal left in the fire box that is wasted. There is no such loss with gasoline, as no fuel is consumed when the engine is not running.

Haying Scene in the North Platte Valley, Nebraska.

ATTENTION REQUIRED.

With a properly installed plant it is unnecessary to remain close to the engine, a visit in a couple of hours or so being sufficient. If the lubricators are of ample capacity, and the circulating water properly arranged, the engine will run until the gasoline supply is exhausted.

ENGINES FOR PUMPING.

When buying an engine to run a pump, be sure that it is of ample capacity. Take the power recommended by the pump manufacturer, and add 15 percent or 20 percent. Then select an engine that will give this amount of power when the proper allowance has been made for altitude. If a pump requires 3½ H. P. theoretically, the pump manufacturers will usually recommended double thus, or 7. H. P. A gasoline engine to run this pump should give at least 8 H. P., and if the altitude is 5,000 feet a 10 H. P. engine should be selected, giving 8½ actual H. P. It will then be found that the engine will run the pump readily, taking an explosion not more often than two times

out of three, or three times out of four. If an engine takes an explosion every time it is liable to run very hot, and will most assuredly require much more gasoline than should be needed for the work. Many mistakes are made in buying engines that are too small.

COST OF IRRIGATING.

A rough idea as to the quantity of gasoline required for irrigating may be gained by the following rules: For small plants about 4-10 gallon will be used per acre per season for each foot that the water is lifted, while for large plants (10 H. P. or more) the quantity may fall to ¼ gallon per acre per foot of lift for the season. The quantity of water pumped will be five gallons per minute per acre of land, the plant to run for 10 hours per day for 120 days. This will give an acre-foot of water, or twelve inches depth over all, a quantity considerably greater than is used for sugar beets and potatoes in the northern district of Colorado. It will thus be seen that the costs of pumping when water need not be lifted more than say 20 feet are not very great (4-10 gallon times 20 feet equals 8 gallons, which at 15 cents per gallon makes $1.20 per acre for the season if one acre-foot is sufficient), and as ample water may be obtained from wells in practically every irrigated country, it is a wise farmer who installs a gasoline plant that he can operate when the water does not run in the ditch, and thus saves his crops. Many such auxiliary plants are in successful operation, and the number installed each year is rapidly increasing. Many plants are also depended upon for the total quantity of water needed, pumping from lakes, ditches or wells. Seepage water that comes to the surface and ruins low land may be collected in a well and pumped upon other land, the water that was injuring one tract thus serving to reclaim another.

Supreme Court Decisions

Irrigation Cases

WAIVER OF RIPARIAN RIGHTS BY APPROPRIATION.—

Settlers on public land, by asserting their right to water for irrigation by reason of their priority of appropriation, thereby waived their riparian rights to the water.—*Davis* v. *Chamberlain*. Supreme Court of Oregon. 98 Pacific 154.

INJURY TO LAND BY LEAKAGE FROM DITCH.—

In an action for injury to land by leakage from defendant's irrigation ditch, whether the land was injured by the seepage of water from defendant's ditch *held* for the jury, and a directed verdict for defendant was improper.—*Paolini* v. *Fresno Canal & Irrigation Co.* California Court of Appeal. 97 Pacific 1130.

CHANGE OF DITCH.—

Where equitable owners of a water right petitioned for a change from one point of diversion to another, the legal owners were entitled to appear and consent or object to the proposed change.—*Bates* v. *Hall*. Supreme Court of Colorado. 98 Pacific 3.

APPROPRIATORS' RIGHTS.—

Decedent having posted notices of appropriation of water for an irrigation project, he and his associates could proceed under such notices to perfect their rights so as to make them valid against all others, excepting those with prior and superior rights to the water.—*Beckwith* v. *Sheldon*. Supreme Court of California. 97 Pacific 867.

VESTED RIGHTS ACQUIRED ON COMPLETION OF CANALS.—

Vested rights in public lands to right of way for ditches, canals, or reservoirs for water purposes, under Rev. St. Sections 2339, 2340 (U. S. Comp. St. 1901, p. 1437), are not acquired until the actual completion of the work, so that the water can be applied to beneficial use.—*United States* v. *Rickey Land & Cattle Co.* Circuit Court, California. 164 Federal 496.

PROPERTY OF IRRIGATION DISTRICT CANNOT BE SOLD WITHOUT VIOLATING TRUST.—

The rule that an exemption from execution of the property of a quasi public corporation only receives from process such property as is necessary to the exercise of the quasi public functions which the corporation has assumed is not applicable to lands of an irrigation district held under an express trust created by Act March 7, 1887, as amended by St. 1897, p. 263, c. 189, where neither a sale of the land by the district nor any execution sale can be made without violating the terms of the trust.—*Tulare Irrigation District* v. *Collins, Sheriff*. Supreme Court of California. 97 Pacific 1124.

DOUBLE FILLING OF RESERVOIR.—

A senior reservoir is entitled to but one filling during the same season on the same priority before junior reservoirs are filled once, under Mills' Ann. St. Section 2403, 2408, providing that a decree must award priorities to the several reservoirs in the water district according to the time of construction and to the extent of its capacity for storage, and that such reservoirs must be separately numbered consecutively according to the priority of appropriation of water made thereby.—*Windsor Reservoir & Canal Co.* v. *Lake Supply Ditch Co.* Supreme Court of Colorado. 98 Pacific 729.

PARTIES TO ACTION TO PROTECT WATER RIGHTS.—

In an action to enjoin irrigation officers from enforcing an order closing plaintiffs' headgates and diverting the water to other consumers, the other consumers were indispensable parties to the action, since the judgment would determine their rights to the water as against plaintiffs, and they should have been brought in under Mills' Ann. Code, Section 16, requiring the court to order other parties brought in where a complete determination cannot be had without their presence.—*McLean, Water Com'r* v. *Farmers Highline Canal & Reservoir Co.* Supreme Court of Colorado. 98 Pacific 16.

TO "FURNISH" IS TO DELIVER WATER.—

A lease provided that "party of the first part agrees to furnish water sufficient to irrigate land above described; said water to come from an artesian well located on land." *Held*, that the word "furnish" was used in the sense of "deliver"—that is, to provide with the right of possession and use—and the covenant was not complied with where the lessor had a well dug and the contractor locked it so that the lessee could not get water therefrom without breaking the lock, and thereby incurring danger of litigation, or by bringing legal proceedings.—*Smith* v. *Hicks*. Supreme Court of New Mexico. 98 Pacific 138.

DUTY TO DELIVER WATER ON LAND.—

Under the contract of plaintiff, an irrigation company with defendants, lessees of land from L., to use its best endeavors to furnish enough water through its canals and laterals to properly irrigate the land, in the absence of any understanding or agreement that it was defendants' duty to furnish laterals to connect the land with the canal, or to keep the lateral of L. in repair, it was the duty of plaintiff to furnish facilities for delivering the water on the land; and it was not enough to turn in into the lateral of L., insufficient from defects and want of repair to take it to the land—*Sisk* v. *Gravity Canal Co.* Court of Civil Appeals of Texas. 133 Southwestern 195.

RIGHT OF WAY FOR DITCHES.—

The fact that a party has located a water right and filed his notice thereof in accordance with law does not give him any right to build ditches and canals across the lands of others until he has acquired the easement and right of way therefore either by purchase or condemnation. The ownership of a water right does not necessarily imply that the ownership of the ditch through which the water flows is vested in the same person. The ownership of the ditch and the ownership of a water right for water to flow through such ditch may exist in different parties.—*Swank* v. *Sweetwater Irrigation & Power Co.* Supreme Court of Idaho. 98 Pacific 297.

PERCOLATING WATERS—STATE POLICY.—

An appropriation of water from a common water-bearing strata for use on distant lands not situated over the strata is subject to reasonable use by the owner of other overlying land upon which he has never used water, especially where such owner bought his tracts because of their situation respecting the water, relying upon the supply, and since without the water the land is of little use. It is not the law's policy to permit any of the available waters of the county to remain unused, or to allow one having the natural advantage of a situation, which gives him a legal right to use water, to prevent another from using it while he himself does not desire to do so.—*Burr* v. *Maclay Rancho Water Co.* Supreme Court of California. 98 Pacific 260.

WATER SUBJECT TO APPROPRIATION.—

It can make no difference that the waters collecting and forming what is known as a spring are seepage and percolating waters, rather than from a well-defined subterranean stream, so long as such waters gravitate to and collect at a certain and definite point and there constitute a volume of water known and designated as a spring. In either case such waters found upon the public domain are subject to location and appropriation for any useful or beneficial purposes under the statutes of this state, and are therefore protected and reserved from future disposition under the act of Congress, Section 2339 of the Revised Statutes of the United States (U. S. Comp. St. 1901, p. 1437.)—*Le Quime* v. *Chambers.* Supreme Court of Idaho. 98 Pacific 415.

TAXATION OF IRRIGATING CANALS.—

Under the provisions of Section 1402, Rev. St. 1887, as adopted by act of February 10, 1899 (Sess. Laws 1899, p. 221), all irrigating canals and ditches and water rights appurtenant thereto are exempt from taxation when the owner or owners of the canals and ditches use the water thereof exclusively upon land owned by the owner of the ditches and water right, but, where any water is sold or rented from such canal or ditch, the same is taxable to the extent of the sale or rental. Under the provisions of this statute, it becomes a question of fact in each case as to whether or not a canal or ditch or water right is taxable in whole or in part, or is entirely exempt from taxation.—*Swank* v. *Sweetwater Irrigation* N *Power Co.* Supreme Court of Idaho. 98 Pacific 297.

PAYETTE, IDAHO, January 15, 1909.

IRRIGATION AGE, Chicago, Ill.:

Once more the name of Canyon County, Idaho, stands in the limelight of public attention as the producer of the finest apples grown in the United States. This acknowledgment of its superior apples was made at the National Congress, held recently at Council Bluffs, Iowa. At that national show the apple exhibit from Canyon County was awarded first prize in the contest in which every apple-growing district of any consequence in the United States took part. This is another victory for irrigation.

In Canyon County the principal horticultural district, the place where the wonderful Jonathans are grown, is the Payette Valley. It was from that valley that the larger portion of the Canyon County exhibit came. For several years the apples from the Payette Valley have taken the principal prizes wherever they have entered into competition with other fruit-growing districts.

While fruit growing has been one of the leading industries of that valley for a good many years, it is only within the last few years that the horticulturists have really awakened to the possibilities of their orchards and have gone into the business on a business basis with the idea of making their fruits equal or superior to fruits from any other place.

Hundreds of acres of new orchards are being set out in the Payette Valley every year, and within a comparatively short time that valley will be one of the greatest fruit-producing sections in the West. It is noticeable that orchardists from other fruit sections are flocking there by the score and buying the best lands and setting out commercial orchards.

They buy good orchard land at prices ranging from $200 to $400 an acre and as soon as their orchards are planted the land is worth from $100 to $200 more than the purchase price, and when the orchard reaches bearing age the land cannot be purchased for less than $500 to $1,000 an acre.

In that valley from 50 to 60 trees are set to the acre. The Jonathans are the leading variety.

GARDEN CITY KANSAS and VICINITY

BY R. H. FAXON.

The greatest factor in the development of this section of Kansas, Garden City and surrounding country in particular, and what is known as the "valley" in general, has been due to the Garden City reclamation project of the government.

This, one of the finest projects in the country, and the only one that has successfully demonstrated the utilization of the "underflow" and the science of waters electrically pumped, was early decided upon after the passage of the reclamation art, approved June 17, 1902. It had a precarious existence in embryo for some months and even years, but the friends of the "underflow" finally triumphed, the investigation of Charles S. Slichter was satisfactory, the fund for the state of Kansas soon warranted the construction of the project, and last year's operation of the plant was all its friends could desire.

Other things have come to Garden City and vicinity: The mammoth sugar plant described in these columns in the January issue of IRRIGATION AGE, the finest and most complete in the country, is a source of pride and a cause for development; and other undertakings that have since come to this section have contributed their full share; but the Garden City reclamation project antedated them all.

In the publication entitled, "Proceedings of the First Conference of Engineers of the Reclamation Service," published in 1904, two years following the passage of the reclamation act, the faithful Garden City men who were pushing for the government project did not meet with much encouragement. The government was not only skeptical; it was feeling its way in the beginning of this gigantic movement into which it had launched; and it was going to take no chances. Positive proof had to exist before a wheel could be turned. Thus it is we find this little paragraph as about the only direct reference in that first reclamation report concerning what is now the great Garden City project:

"In Kansas a number of small projects have been examined, but none of these appears to fall within the scope of the reclamation law. A very thorough study has been made of western Kansas and of the Great Plains in general, in order to ascertain the opportunities for obtaining deep or artesian water. A map showing the depth to the waterbearing strata and the probability that the water will rise to the surface has been prepared and is in process of publication."

Thus was the subject dismissed so far as Kansas was concerned.

In the third annual report of the Reclamation Service, printed in 1905, we have more space devoted to Kansas and to a Kansas project. Little by little the state and the Garden City region were being recognized, and the principle of the "underflow" of the Arkansas river was being demonstrated to the government engineers.

Another encouraging feature was the fact that the portion of the reclamation fund allotted to Kansas was constantly growing. In the year 1901 it had amounted to only $20,000; in 1902 it was $29,000; in 1903 it fell off slightly from the preceding year and was a little short of $28,000, while in 1904 it was $32,000, or a total by then of $109,000. This began to be a sufficient amount to justify action if the conditions should warrant. And, slowly but surely, the conditions were forcing themselves upon the engineers.

Meanwhile, and in 1904, Charles S. Slichter of the University of Wisconsin had been making an examination of the underflow of the Arkansas river. The water-plane or ground-water level was accurately mapped out for a distance of from 6 to 12 miles from the river channel, and the electrical method enabled the observance of the underflow's movement. The slope of the water-plane was found to be between 7 and 8 feet per mile in a general easterly direction, and from 2 to 3 feet per mile toward

the river channel from the country immediately to the north and immediately to the south of the river. Determinations showed a rate of movement of the ground waters much greater than had been expected, according to Mr. Slichter's published report of 1904. The velocities of the ground water at the stations established were found to be remarkably uniform. The gravel was exceedingly uniform in size and character of grain.

Mr. Slichter said of the formation of the underflow, and in disagreement with the popular theory that it is formed as a vast underground river coming down from the mountains:

"The summer's investigation indicates that the water of the Arkansas underflow has its origin in the rainfall upon the sandhills to the south of the river, upon the bottom lands of the valley, and upon the plains north of the river. The average rainfall in the vicinity of Garden City is about 20 inches per year. A very large portion of this must pass into the open and porous soil, so that the actual contribution to the underflow must be considerable. If the gravels beneath the plains were not so open, so deep, and so wide, the seepage waters would be obliged to seek relief in surface streams, but the underground conditions are such that ample drainage is offered by porous beds of gravel several hundred feet in depth. In short, the underground drainage in this region is so enormous and the water passes through the gravel so freely that there is no surplus left to form surface streams or a perennial supply for Arkansas river."

Mr. Slichter reviewed the purpose and result of his investigation, referring to the irrigation practiced at that time and for many years, by means of canals in the valley and small windmill or gasoline engine in the upper country. He declared the great problem was that of fuel, and suggested that as petroleum had been found in enormous quantities in eastern Kansas this might solve the question. It has done so, just as Mr. Slichter pointed out, both the Garden City reclamation project and the great sugar factory now using crude oil. He also said as to the recovery of the underflow:

"Careful consideration has been given to the matter of the recovery of ground water in Arkansas river valley by means of gravity. The investigations have shown that the recovery of ground water by means of infiltration galleries or any other form of gravity works is entirely impracticable."

He gave the reasons, largely this: The slight slope of ground, and the fact that infiltration galleries in actual use for irrigation had not proved successful. He then stated a project was feasible, and the first long step toward the success of Garden City and vicinity of today was taken.

Preliminary plans and estimates for the Garden City project were submitted to the project board at Denver, March 24, 1905. The board recommended the continuance of the investigations and estimates made for future consideration. At Garden City, in September, 1905, the board again met and recommended the construction of the project as soon as the water users' association could be formed and the area appropriated. One month later the project was approved.

The underflow of the Arkansas river at Deerfield, just west of Garden City, was appropriated to the extent of 200 second-feet for the United States Reclamation Service and notice duly filed according to the laws of the state of Kansas. The water users' association was formed and received applications from the owners of about 12,000 acres. Contracts were approved for an acreage of 9,625, but the area was restricted to 8,600 acres. It is possible that 15,000 acres can and will be utilized later.

It is important to recognize the fact that all the land under the Garden City project was private at the time of the inception of the project and at the time it was finally started.

The Garden City project is situated along the Arkansas river west of Garden City and just east of Deerfield station, on the main line of the Atchison, Topeka & Santa Fe railroad. The irrigable areas are in the bottom lands of the river and include portions of Kearny and Finney counties. The land has an elevation of practically 3,000 feet. The soil is a rich prairie loam, characteristic of the rich plains of western Kansas. The annual range of temperature is from a minimum of 20 degrees below zero to 105 above. The average annual rainfall is about 20 inches. The size of farm units at present is 160 acres, but more and more is growing the feeling that the unit should be reduced at least to 80 acres if not to 40 acres, which will be the inevitable result. Land which formerly was worth $35 to $50 per acre now sells anywhere from $75 to $125 per acre, and the latter figure is nearer the average. The principal products are sugar beets, alfalfa, wheat, melons and sweet potatoes, while small fruit growing is being practiced more and more.

The power station develops 600 horsepower in two units with water-tube boilers and De Laval steam turbines. The power is transmitted electrically by 6,600-volt, 3-phase alternating current to 23 pumping stations, 13 on the south side of the river, at right angles with the river, and 10 on the north side, parallel with the river. These are lined up alongside a concrete-lined conduit 20,000 feet in length. The ten stations north of the river and the first three south of the river each have twelve 15-inch shallow wells, 35 to 60 feet deep. The remaining ten wells south of the river have twelve 15-inch shallow wells. The power-transmission line has length of 25,000 feet. The river is crossed by a siphon made of 42-inch internal diameter wooden stave pipe. Each pumping unit consists of a vertical shaft 9-inch centrifugal pump, direct-connected to a 25-horsepower motor. It is estimated by the statistician of the Reclamation Service that each group of ten wells at each of the 23 pumping stations will yield 6,580 gallons per minute under a 15-foot head. During the irrigation season this leviathan pumping system will lift 30,000 acre feet, or 10¾ billion gallons.

The work of the government has already given a decided impetus to private enterprise in the Garden City section and will greatly stimulate the, development of similar projects in other valleys of the Great Plains where there are similar conditions to those existing in the Arkansas valley.

Two things have resulted from the construction and successful operation of the project that are well worthy of note in addition to the fact that the project has, brought the sugar factory and other institutions to Garden City and vicinity. These are: Winter irrigaton and a decrease of the unit of farms, heretofore referred to.

The doctrine of winter irrigation is comparatively a new one to be preached in western Kansas, though some pioneers have tried it successfully for some time. The use of water on certain occasions the present winter from the reclamation project, and the direct encouragement the sugar company has given to this system, have resulted in the essay at winter irrigation in the Garden City vicinity this year for practically the first time in any united and not purely spasmodic manner. The direct results are confidently awaited when the approaching season shall have demonstrated the wisdom of the pioneers.

The reduction of the unit of farm to 80 acres and, in the end, to 40 acres, is being impressed as a necessity and the part of wisdom, more and more. The fact that 40 acres of land, under the ditch, with the successful operation and guardianship of the Garden City reclamation project, whether that land be put in to alfalfa, sugar beets, or fruits and truck, plus the use of water in the winter time, is enough for any intelligent and practical man to use, is rapidly being forced upon the minds of the owners. It will not be long until both winter irrigation and the 40-acre unit will be well observed in the Garden City vicinity.

There has just been issued from the press of The Caxton Company, Cleveland, Ohio, a 7,000 edition, 80-page catalogue for the Dayton Globe Iron Works Company, of Dayton, Ohio, describing and illustrating the New American Turbine. It is printed on 100 high-grade coated paper, which brings out every detail of the many half-tone illustrations. The cover is of dark gray stock with a light gray fly leaf, and is highly embossed with the company's name and the name of the product. A very pleasing effect is obtained by the use of a tint block, in a delicate shade, which overcomes the high gloss of the paper stock and makes the illustrations more attractive by having the high lights cut away and bringing them out in white.

Reclamation Service News

At the request of Chairman Reeder of the House Committee on Irrigation, Director F. H. Newell, Supervising Engineer H. N. Savage of the northern division, E. G. Hopson of the Pacific coast division, Project Engineer Christian Andersen, Washington, and C. J. Blanchard, statistician of the Reclamation Service, appeared before the committee recently. The hearing was of unusual interest, and was unique in that it was illustrated with beautifully colored stereopticon views showing the progress of the work of the Reclamation Service. It is proposed to continue these hearings in order to permit other supervising engineers now en route to Washington to present to the committee the more important features of the reclamation work.

The northern division consists of Montana, North Dakota and northern Wyoming. Of the fourteen projects in this territory five have already been placed in operation in part, water being available for a total of about 83,000 acres. Sixty thousand acres additional will be opened this spring.

Some novel engineering features are involved in the construction of these projects, including the building of a dam in the canyon of the Shoshone river in northern Wyoming, which will be the highest structure of its kind in the world. It will be 328.4 feet in height from bed rock to top of parapet walls. Placed side by side with the national capital it would extend 21 feet above the top of the Statue of Liberty. It will hold back waters to irrigate about 150,000 acres of fine land in the heart of Buffalo Bill's old stamping ground.

In western North Dakota where the low grade of the Missouri river makes it impracticable to build gravity canals, and where on account of the shifting banks of the stream it is difficult to build permanent headworks, pumps have been placed on barges and connected with the shore by pipes with flexible joints. The water is pumped into settling basins, from whence it is taken by distributing canals. Power for pumping is generated by utilizing the lignite coal, vast deposits of which are found in the vicinity. This power is transmitted electrically to the various pumping stations, some of which are 25 miles distant.

The state of Montana comprises the larger part of the division. In area this state is more than twice as large as all New England with the state of Maryland thrown in. Within its boundaries three projects are already open and are being extended. Work is being commenced on several Indian reservations and the Milk River project is well under way. This latter system is attracting considerable attention at this time by reason of the international treaty between the United States and Canada which is now being considered by the Senate.

The second of the illustrated hearings before the House committee on irrigation was given recently at Washington to permit Supervising Engineer E. G. Hopson, in charge of the Pacific coast division, and Christian Anderson, project engineer in charge of the Okanogan project, Washington, to explain to the committee the progress of the engineering work in those parts of the West.

Mr. Hopson took up in detail the construction work on the several Yakima Valley projects in Washington, and devoted some little time to an exposition of the wonderful development which has taken place in that section since the government initiated its work. The stereopticon views of crop scenes, especially the apple orchards, were beautifully colored and interesting. Considerable attention was given to other projects in his division, notably the Umatilla in northern Oregon, the Klamath, California-Oregon, and the Orland in California.

Mr. Andersen's discussion related chiefly to the construction of a dam by a unique process known as the hydraulic fill. The dam will be 1,000 feet long, 300 feet wide on the bottom, and 60 feet high. The water for hydraulicking is brought in a wooden flume along steep and rocky slopes a distance of five miles to the dam site, where it is used in hydraulic giants to tear the material loose. The water, earth and gravel are then carried by gravity through other flumes directly over the dam site, separated by a clever device, and dropped in place, the finer material in the center and the coarse rocks on the outside

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A report recently received in Washington on the results of flood water irrigation under the Okanogan project, Washington, is most interesting in view of the recent opening of the first unit of this project. No stored water was available in 1908, but the distribution system was completed to a point where it was practical to deliver water during flood or high water stage of the river. A price of $1.50 per acre was fixed and forty-three ranchmen availed themselves of the privilege. Irrigation was carried on from May 15 to July 6. Very little of the lands to which water was applied had been previously cultivated, but it was broken up and planted to fruit, vegetables, wheat, corn, and other cereals. Fruit predominated, with 600 acres, or 60 percent of the lands thus irrigated being planted to fruit. All the lands except those planted to wheat and oats were watered by furrows, and received from one to three irrigations. The results obtained were remarkable when it is considered that no water was used after July 6, or during July and August, the hottest and dryest months of the summer when water is considered most essential.

Fruit trees of all kinds made vigorous and hardy growths. While some losses occurred, it is believed that they were from other causes than drought. The results demonstrate that the lands under the project are especially adapted to fruit culture and that it is possible to grow young orchards successfully without irrigation during July and August. Wheat, oats and corn did fairly well, about half a crop being harvested. Vegetables and garden truck were almost a complete failure. The plants grew strong and vigorous as long as water was available, but perished later from drought, demonstrating that the lands will grow vegetables in abundance, but that these plants must have water during July and August to mature them.

The Orland Unit Water Users' Association of Orland, Cal., have petitioned the government to construct a distribution system on the south side of Stony Creek in time for use during the irrigation season of 1909. The petition states that the land owners have only a short time in which to dispose of their excess holdings prior to the delivery of water by the government system and that the construction of the distribution system, as requested, would facilitate the sales of land in the district. The petition will be laid before the Secretary of the Interior for consideration.

Mr. D. C. Henny, supervising engineer in the Reclamation Service, has resigned his position to take up private work. He will act, however, from time to time in the capacity of consulting engineer in the service.

The northwestern district, consisting of the states of Washington, Oregon, Nevada, and practically all of California, has been in the joint charge of Supervising Engineers Henny and E. G. Hopson, with headquarters at Portland, Ore. This district has been divided and after February 1, Mr. C. H. Swigart, now in charge of the Tieton project, Washington, will have supervision of the entire state, Mr. Hopson retaining supervision of Oregon, Nevada and California.

Mr. Swigart was educated in Heidelberg College, Tiffin, Ohio, and has been engaged in engineering work since 1887, having been engaged principally in railroad construction, dredging, bridge and dock building. He is most enthusiastic over the future of the Yakima Valley, and stated that although he had resided in many parts of the United States, in his opinion the Yakima Valley offered the most ideal conditions for a home of any section of the country. He related a little incident which goes to prove that he is not alone in his estimate of the valley.

Under the Sunnyside project a small tract of land was opened to settlement a short time ago, consisting of about 14,000 acres, of which 3,000 acres were government

land subject to entry. Every acre was taken inside of two weeks in spite of the fact that it was not generally known that there was any land open to entry. When it was found out there was a mad rush of settlers to the lands. The trains were taxed to the utmost and wagons and automobiles were pressed into service. Mr. Swigart states that between 45,000 and 50,000 acres under the Sunnyside project will receive water this year, including the land which was previously irrigated under the old Sunnyside system. No land will be irrigated under the Tieton project this year, but about one-third of the total acreage can be served in 1910. The work at present on this project consists of excavation on the tunnels and main canal, and lining the tunnels with concrete, the force being on a winter basis. On the Sunnyside, however, advantage is being taken of the winter season and the lower end of the main canal is being enlarged and completed to the Mabton siphon. Work is also being rushed on the distribution system and the Sunnyside wasteway.

During the past year the farmers were extremely prosperous, although fruit did not bring the extremely high prices of the previous year. Alfalfa is a good crop, the price last November being about $13 baled at the ranches. Timothy brought from $20 to $25 per ton. Alfalfa averaged about six tons to the acre, and timothy three tons. Potatoes brought $14 a ton and yields of from 200 to 600 tons per acre are reported, although the latter figures are abnormal.

The Secretary of the Interior has authorized the execution of contracts for the sale of timber on lands surrounding lakes under the Yakima irrigation project, Washington, as follows:

To Joseph F. Walsh, of Clealum, Wash., Lake Clealum, timber, amounting to $40,434.78.

To F. C. Wescott, Ellensburg, Wash., Lake Kachess, timber, $15,309.91.

To the Flanagan Mining Company, Akron, Ohio, Lake Keechelus, timber, $82,159.34.

At the request of the governor of Idaho a tract of land approximating about 14,000 acres, which was withdrawn in connection with the Dubois irrigation project, Idaho, has been restored to the public domain. These lands which lie in township 6 north, ranges 34 and 35 east, are included within a segregation under the Carey act for which the state of Idaho recently filed application. In view of the fact that the reclamation of these lands by private enterprise seems assured in the near future, the department has made the restoration, which becomes effective upon allowance of the state segregation.

The Secretary of the Interior has fixed the maximum limit of the irrigated area for which water right applications may be accepted for lands in private ownership under the Sunnyside irrigation project, Washington, at 160 acres.

The Reclamation Service has been authorized to execute contract with the Des Moines Bridge & Iron Works of Des Moines, Iowa, for furnishing structural steel for use in connection with the power house now in course of construction on the Minidoka irrigation project, Idaho. The contract price is $2,687.80.

The power canal on the Strawberry Valley project, Utah, has been completed and water turned into the pressure pipe at the powerhouse. Some difficulty is being encountered in operating the power canal on account of the extreme cold weather. Heavy winds at the mouth of the canyon blow snow into the canal, causing anchor ice, but the canal is patrolled night and day and every precaution taken to prevent damage to the works. In anticipation of the new power being turned on, work was commenced on the tunnel in December, and an advance of 46 feet was made. The work at present is in medium lime rock. The ground stands well and no timbering is being done.

An extension of three months has been granted to Cole Brothers, of Orman, S. D., in which to complete their contract for constructing a portion of the lateral system under the Belle Fourche irrigation project, South Dakota. The contractors were unavoidably delayed in their work by unfavorable weather conditions.

Contract has been awarded to the Fulton Engine Works of Los Angeles, Cal., for furnishing two 42-inch balance valves for use in regulating the discharge from the penstock communicating with the Roosevelt reservoir, Salt River irrigation project, Arizona. The contract price is $7,500 for material, $10 per day to be charged for the service of an erecting engineer furnished by the contractor, and foundation bolts with anchors at the rate of 4¾ cents per pound.

The Secretary of the Interior has approved the contract between Mr. Louis C. Hill, acting on behalf of the United States, and the Consolidated Canal Company, an Arizona corporation, whereby the government agrees to purchase from the aforesaid company canals having a total length of about 30 miles and water rights and other features incident thereto.

The price to be paid for the property is $187,000, payable $50,000 upon conveyance of title in fee simple to the United States, $50,000 on January 1, 1910, and $87,000 on January 1, 1911. The United States will assume the obligations under existing agreements of the company to furnish water to those under contract with the company, and also agrees to furnish sufficient water for power at the power plant now operated by the company for the generation of electric power to the extent of 300 kilowatts, or, to furnish an equivalent amount of power for which payment will be made to the United States at the rate of one-half cent per kilowatt hour.

The properties of the Consolidated Canal Company constitute the key to that entire portion of the Salt River project lying south of the Salt river. The canal was constructed some years before the inception of the Salt River project, and the company has irrigated from the system a total of approximately 4,000 acres.

Valuable possibilities are open to the government by this purchase for the development of power.

An extension of ninety days has been granted to Messrs. Campbell and Huffman of Klamath Falls, Ore., for the completion of their contract to construct wooden flumes in connection with the Klamath project, Oregon. This advances the date of completion to February 27, 1909.

Contract has been awarded to the Niles Bement Pond Company of New York for installing three ten-ton and one twenty-ton hand cranes for use in connection with the power plants under the Minidoka irrigation project, Idaho. The bid of the contracting company was $3,643.

Subject to the terms and provisions of the public notice dated November 18, 1908, opening to irrigation in the season of 1909 certain lands under the Klamath project, Oregon-California, the Secretary of the Interior has given notice that water will also be furnished under the Klamath project in the irrigation season of 1909 to certain lands in T. 39 S., R. 9 E., Williamette meridian. The farm unit plat showing these lands is on file in the local land office at Lake View, Ore.

The Secretary of the Interior has withdrawn from any form of disposition whatever under the public land laws about 25,000 acres of land in connection with the Wapato irrigation project, Washington. These lands lie in townships 11 and 12 N., ranges 16 to 19 east, Williamette meridian.

The Secretary of the Interior has authorized the approval of a contract entered into by Louis C. Hill on behalf of the United States, and Shattuck & Nimmo Warehouse Company, of Los Angeles, Cal., whereby the latter agrees to transfer from Mesa, Ariz., to the government oil tanks at Roosevelt, Ariz., 33,000 barrels, more or less, of crude fuel oil for use in connection with the Salt River irrigation project. The rate agreed upon for hauling this oil, $3.15 per barrel, will entail an aggregate expenditure of $109,950.

The engineer in charge of the Strawberry Valley irrigation project reports that good progress is being made, although the work is occasionally delayed by heavy snowfall. One thousand eight hundred and eighty-eight cubic yards of concrete were placed in the canal aqueduct and wasteway, practically completing the concrete work. The diversion dam has been completed, and the bank for the protection of the Denver & Rio Grande railroad embankment and track was also finished. This bank is 750 feet

(Continued on page 123.)

SHOSHONE, IDAHO.

A Coming Western City.

BY H. A. THOMAS.

It is indeed gratifying to the inhabitants of Shoshone to note the past and present growth and industrial progress, and to anticipate the great things that the future holds in store and must inevitably yield. Founding an opinion upon the natural and necessary consequences of the peopling and developing of the vast reclaimed area with which we are surrounded, and which is directly tributary, it may with safety and conservatism be predicted that Shoshone is approaching a very prosperous epoch.

While the construction of spacious reservoirs, the building of great canals, the harnessing of mighty torrents for power, the extension of railroads, the building of homes, the improvement of lands and the birth of cities is in evidence on every hand, we can but realize that there are yet latent resources which, when discovered and diverted to man's convenience, will place Southern Idaho in the foremost rank of the land of opportunity in the Northwest.

Shoshone has reason to be grateful that her founders established her in the exact geographical and commercial center of the most promising section of this great reclaimed empire. There are directly tributary to Shoshone, 150,000 acres of irrigated lands, of which 50,000 will be open to settlement under the Carey Act, within one mile of the eastern limits of this city, during the next few months. When the projects now under construction are completed, Lincoln county, of which Shoshone is the oldest and the largest city, and also the capital, will have an area of not less than 700,000 acres of reclaimed soil, which is not surpassed in richness by the literal compost heap. Shoshone is also within easy access of the many great waterfalls of the Snake, the Big and Little Wood Rivers, from which electricity representing many hundred thousand horsepower will be generated. There is also a prospect of this city becoming a railroad center of no little importance. It has already the distinction of being the junction city of the main line of the Oregon Short Line Railway, and the Ketchum-Hailey branch, and hence the entrepot for the smaller towns of this county and for the rich agricultural and mining districts of Blaine and Custer counties, and surveys have been completed and the construction assured of an extension of the Twin Falls & Wells, Nevada line from the former point to this place, and from here on to the well known cereal producing acres of the prodigious Camas Prairie country. It is believed that the contemplated terminus of this railway will be at the city of Boise. There are at present six daily passenger trains into and through Shoshone, four of which are trans-continental. A freight division has recently been established here and the company is now preparing to reinstate the machine shops, for which there are an excellent set of buildings, including a twenty-four stall lava rock round house, already in waiting. The name of Shoshone is familiar to all of the stock yard men, and the wool buyers of the East, owing to its having been the center for many years of one of the grestest grazing regions of the Northwest. There are more sheep raised and wool shipped from this point than any one point on the main line, and with the reclaiming of the vast amount of land near Shoshone, unexcelled facilities will be afforded for winter feeding of all kinds of livestock. The exceedingly mild climate of this section, together with other numerous advantages, has been responsible for the millions of dollars that have been realized from the sheep industry in the vicinity of Shoshone.

The adaptability of the soil and climate to the culture and growth of clover, alfalfa and other forage plants, will afford unexcelled opportunities for the poultry man and the dairy industry, as statistics show that over ninety percent of the eggs and butter consumed in the state are imported from states east of the Rockies.

The recent severe storm which has been such a menace to states east and north, has proven beyond doubt the advantages of Southern Idaho, for while, during the past week not less than fifteen inches of snow has fallen, the sheep men have not even attempted to get their herds to winter quarters, but are unconcernedly staying within their winter range, having been taught by past experience that the warm rains which are now falling will soon reduce the snow and start the nutritious bunch grass for spring grazing. The newcomers are also elated at the prospects of the condition of the soil and of good crops as a result of the amount of precipitation. Up to the present time the mercury has not reached a point below zero.

No unoccupied buildings, whether for business or residence purposes, although a number are being planned now, are to be found in Shoshone. A demand exists for more cottages and other buildings, and store rooms and offices are at a premium. The rapid increase in population is responsible for these conditions, as almost daily persons are forced to leave because of their inability to secure suitable quarters in which to engage in business. Much real estate remains to be had in desirable localities, and at reasonable figures. The citizens of Shoshone are progressive and industrious and may well take pride in the fact that the business transacted by their city is equal to that of many places several times its size.

WEISER AND THE WEISER VALLEY, IDAHO.

The Home of the Big Red Apple—The Great Orchard Section of the Gem State.

Out in Idaho, the Gem State of the Union, on the banks of the great Snake river, the fifth largest stream in the United States, where the Weiser discharges its waters into the Snake, from whence they are discharged into the great Columbia and thence into the calm Pacific, nestling in one of the most productive and fertile valleys of the entire western country, is Weiser, the bustling little city of beautiful homes, splendid schools, fine churches of every denomination, surrounded by thousands of acres of the most fertile land to be found anywhere, a land to which nature has been most generous, providing productive soil, and unlimited water supply and a climate unexcelled. The thermometer seldom goes down to the zero mark in this favored land. While other sections have been wrestling with storms and zero weather, the Weiser valley has been basking in sunshine. The thermometer this winter has not gone below ten above zero.

Weiser valley is the home of the big red apple. No other section is so favored as this for the raising of apples. Other fruits, such as peaches, pears, prunes, grapes, strawberries and small fruits of all kinds, do well, but it seems peculiarly adapted to apple raising. During last season more than 125 cars of apples alone was shipped from the Weiser railroad station to eastern markets, and double that number will be shipped this year.

From 1,000 to 1,200 acres of apple orchards will be set out this year. The varieties which seem best suited to this section are Rome Beauties, Winesaps and Jonathans, although other varieties do well. For the man looking for a home in the west where he can engage in the raising of fruit, no section can offer better inducements. Plenty of water for irrigation, land that is cheap at the price, finest climate in the country, all combine to make the Weiser Valley an ideal place for home.

Weiser is on the main line of the Oregon Short Line railroad, a little city of 4,000 inhabitants, with all the modern conveniences of an eastern city of 20,000. If you desire any information concerning Weiser or the Weiser valley, address the Secretary of the Weiser Commercial Club, Weiser, Idaho, who will gladly give all the information desired.

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This sticky preparation applied directly to the bark of trees is a complete protection against all worms, moths and other pests. It was used last year with remarkable success throughout New England in protecting fruit and shade trees. Easily applied and long lasting. Its low cost leaves no room for excuse in not using it. Everyone having either shade trees or fruit trees is interested in their protection and all are earnestly urged to write the O. & W. Thum Company, Grand Rapids, Mich., who will send them entirely free by mail a book containing much instructive, interesting and valuable information.

We are presenting herewith copy of testimonial letter received by the Chicago House Wrecking Company, which speaks well for that concern:

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Irrigation for Farm and Garden, Stewart	1.00
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Send for our new folder, with large map, and also folder issued by the Reclamation Service of the United States Government, giving all information about these lands, terms, etc. Free for the asking. Address

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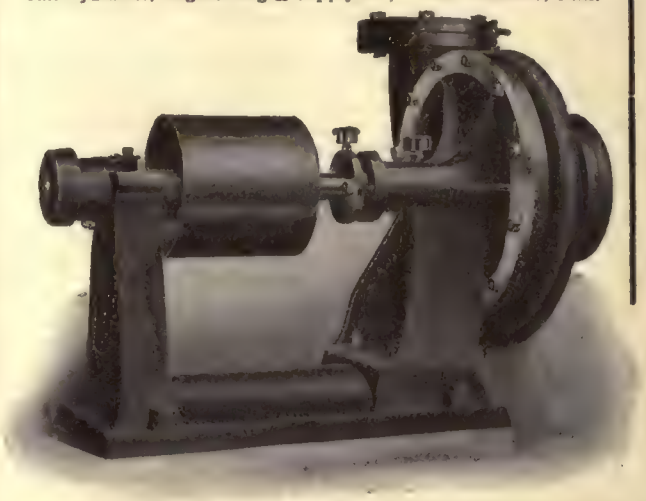

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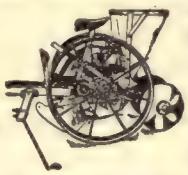

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THE O. & W. THUM COMPANY, Grand Rapids, Mich.

RECLAMATION SERVICE NEWS.

(Continued from Page 119.)

long, 25 feet wide, and from 2 to 20 feet high. In connection with this work a new channel was excavated for the Spanish Fork river and the water diverted from the old channel. The erection of the embankment necessitated the moving of 9,100 cubic yards of earth. The installation of machinery and wiring at the power station is practically completed. The erection of the penstock was finished and considerable topographic work done.

In the instructions heretofore issued in connection with the Truckee-Carson irrigation project, Nevada, the limit of distance to be regarded as residence in the neighborhood to permit sales of water right for land in private ownership was fixed at 20 miles.

Within a distance of 50 miles from the project there are a number of large and promising mining camps, also the towns of Reno, Sparks, and others, and many inquiries have been made as to whether residence in these places would be regarded as sufficient in order to secure the benefits of the Reclamation Act.

Believing that the present limitation is a hindrance to the rapid development of the country, and that persons residing within a limit of 50 miles should be permitted to obtain water from the project and that they may, within the intent of the law be regarded as residing within the neighborhood, the Secretary of the Interior has issued an order extending the limit of distance to 50 miles.

The Lower Yellowstone National irrigation project, Montana-North Dakota, has been completed and water will be available for irrigating 45,000 acres during the season of 1909.

This is the second national project constructed on the Yellowstone, and inaugurates entirely new methods of farming in the lower valley of this river. Heretofore agricultural development has been slow and not wholly profitable, owing to the uncertain and deficient rainfall. With the assurance of an abundant supply of water from the Government's canals, intensive agriculture will be practiced and crop yields greatly increased. Nearly all of the public lands under the project have been filed upon, but there are numerous opportunities to secure private and railroad lands, and relinquishments of excess lands now held by settlers. Farmers accustomed to the agricultural practice of Minnesota and North Dakota will find this an excellent field.

The irrigable lands are in Ts. 18 and 19 N., R. 57 E.; 19, 20, 21 and 22 N., R. 58 E.; 21, 22, 23, 24 and 25 N., R. 59 E., and 24 N., R. 60 E., Montana principal meridian, and in Ts. 150 and 151 N., R. 104 W., fifth principal meridian.

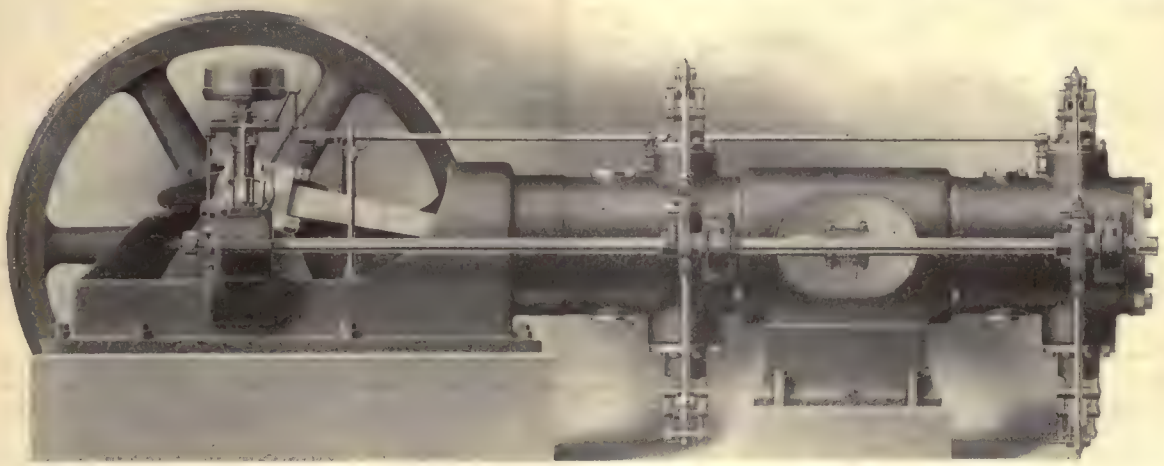
Plats showing the location and area of the various farms which may be entered upon the provisions of the homestead laws and irrigable lands in private ownership are on file in the local land offices at Miles City, Montana, and Williston, North Dakota.

The water right charges are divided into two parts, namely, for building the work and an annual charge covering the cost of operation and maintenance. The part for building the works has been fixed at $42.50 per acre of irrigable land, and this may be paid in annual installments of $4.25 per acre, or some multiple thereof, without interest. The part fixed for operation and maintenance until further notice is $1 per acre of irrigable land per annum.

For new entries one full installment of the charges for building, operation and maintenance, $5.25 per acre of irrigable land, must be paid at the time of making entry and water right application at the United States land office at Miles City, Montana, or Williston, North Dakota. The second installment will be due and payable on December 1 of the following year and subsequent installments on December 1 of each year.

For private lands and land heretofore entered within the irrigable area the first installment will be due and payable December 1, 1909. All water right applicants are required to join the Lower Yellowstone Water Users' Association, which has contracted with the United States guaranteeing the payment of water-right charges by its members, who give the association a lien on their lands.

The BUCKEYE FOUR-CYCLE GAS ENGINE



SIMPLE IN CONSTRUCTION - ECONOMICAL IN OPERATION - RELIABLE

CATALOG ON APPLICATION

BUCKEYE ENGINE COMPANY, - - Salem, Ohio

Four Indisputable Reasons Why Pecos Valley, Texas, Excels

Best Irrigation Project in America : : Facts All Prove It

1. CLIMATE—Ideal, with 345 days of sunshine every year. Summer temperature 67, winter 51, humidity 33, altitude 2,200 feet, no hot winds, no blizzards, U. S. Signal Service says climate is better than California, North Carolina or Florida.

2. SOIL—A rich, deep, sandy loam, ranging from dark chocolate to reddish in color, eighteen to thirty feet deep, no alkali. Pronounced by experts who have seen it "to be the finest body of land in America for irrigation."

3. AMPLE WATER SUPPLY—Our reservoir—two miles square, seventeen feet deep—holds 20,000 acre feet of water. Forty miles of canals serve water for irrigation. Wm. L. Rockwell, Government Irrigation Manager, says the duty of water in Pecos Valley should be one cubic foot for every 150 acres, while we guarantee one cubic foot for 80 acres, or approximately TWICE THE AMOUNT of water needed for irrigation. The rainfall is EIGHTEEN INCHES. It is believed artesian water underlies this lower Pecos Valley; in fact, on these lands, at 130 feet, ninety feet of good water has been found.

4. MARKETS—When the Orient Railroad reaches the lower Pecos Valley, which should be in twelve months, direct communication with the markets of the world, North, East, West and South, can be obtained. Meanwhile, there is a big demand for everything that can be raised. Alfalfa, which cuts seven tons per acre, NOW sells for $16 a ton at Grand Falls, just across the Pecos River from our land. The cattlemen who pasture hundreds of thousands of steers on the plains adjacent must have feed through the winter.

NO OTHER IRRIGATION DISTRICT IN THE UNITED STATES IS SO WELL AND FAVORABLY LOCATED.

With ideal climate, making your future home both healthful and delightful, a rich and fertile soil, plenty of water to guarantee bountiful crops, and a splendid market for all you raise, why do you hesitate to make the lower Pecos Valley your future home?

YOU MUST KNOW WHAT THESE LANDS WILL PRODUCE

Every crop known to irrigation can be successfully grown on this land, and we give below the valuation of crops raised per acre in this vicinity:

Alfalfa	4 to 8	tons	per acre
Broom Corn	1 to 2	"	"
Cane	4 to 8	"	"
Wheat	20 to 50	bush.	"
Oats	50 to 100	"	"
Corn	30 to 60	"	"
Maize	50 to 75	"	"
Kaffir Corn	50 to 75	"	"
Fodder	4 to 6	tons	"
Onions	5 to 7	"	"
Cotton	½ to 1½	bales	"
Sugar Beets	$100		"
Celery	$500		"
Asparagus	$500		"
Lettuce	$250		"

Tomatoes	$200 to $400	per	acre
Sweet Potatoes	15,000 to 20,000	lbs.	"
Cantaloupes	$300 to $500		"
Pumpkins and Kershaws	$100 to $200		"
Irish Potatoes	$75 to $150		"
Pears	$800 to $1200		"
Apples and Peaches	$300 to $600		"
Soft Shell Almonds	$250 to $500		"
Figs	$300 to $600		"
Grapes, all varieties	$150 to $400		"
Radishes	$150 to $400		"
Cabbage	$300 to $500		"
Strawberries, Gooseberries, Raspberries, and all kinds of berries	$250 to $500		"

READ WHAT OTHERS ARE DOING ON IRRIGATED LANDS A FEW MILES FROM OURS:

"My ten-year-old orchard, in 1907, netted me $1,000 PER ACRE." C. W. Griffin. This is the orchard that took first premium at the St. Louis World's Fair.

"The average yield of alfalfa at TWO YEARS old is SIX TONS per acre, at $12.50 per ton, $75 PER ACRE."—E. D. Balcom.

"I have just satisfied myself that from 40 acres of alfalfa a net profit of $2,232 can be made in a year."—J. A. Barge.

"I have sold from THREE-FOURTHS OF AN ACRE of sweet potatoes, $140 worth, and have one-half my crop left. Some weighed as much as 14 pounds."—W. Peninger.

The Highest Authorities In America!

Could we give you better testimonials? Better evidence that this is the greatest land proposition in the United States?

W. L. ROCKWELL, IRRIGATION MANAGER U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.,

Writes F. A. Hornbeck, Land Commissioner:

"Dear Sir: I have lately visited the location of your contemplated irrigation system in Pecos Valley. I feel that you should congratulate yourselves and your engineer for finding such a NATURAL RESERVOIR so closely located to this EXCEPTIONALLY FINE BODY OF LAND. If you were to hunt the length and breadth of the arid West I DOUBT if you COULD FIND so large a tract of land LYING SO NEARLY IDEAL FOR IRRIGATION."

F. D. COBURN, SECRETARY OF KANSAS STATE BOARD OF AGRICULTURE, SAYS:

"The country I looked at especially was the lower Pecos Valley, in Pecos County, now about to be opened up to settlement. It will be made directly tributary to Kansas City by the Orient Railway. The best of the lands here are certainly FAVORABLY SITUATED FOR IRRIGATION. They are being disposed of at prices and on terms attracting purchasers from all parts of the Union. Landseekers are met on every train."

Don't Forget! This is Opportunity's Knock. The price of this rich, irrigable land, with a perpetual water right and a proportionate interest in a reservoir two miles square, 17 feet deep, and 40 miles of canals, now is only **$40 an acre.**

BEST AND CHEAPEST IRRIGATED LAND IN THE UNITED STATES

F. A. HORNBECK, LAND COMMISSIONER, Kansas City, Mexico & Orient R. R. Kansas City, Mo.

Union Lock Poultry Fence

Square close mesh. Highest quality, superior lock, easily erected, strong, low priced.

Write for new catalog describing the Union Line of Field, Hog, Poultry and Lawn Fences.

Union Fence Co.
De Kalb, Ill.
Kansas City, Mo.

RANGER BARB WIRE

Running Water Everywhere

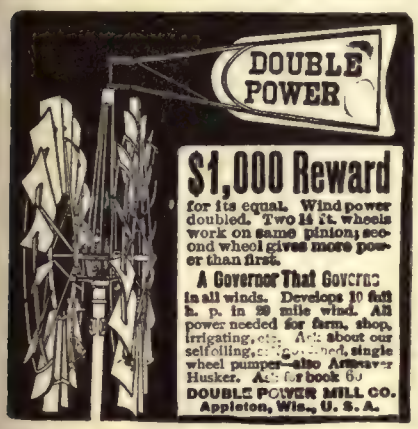
A constant supply for as many purposes on your place as you desire, No trouble, no expense when you have installed a

RIFE HYDRAULIC RAM

Pumps water from spring, stream or pond automatically. Inexpensive, simple, reliable. **Satisfaction Guaranteed.** Raises water 30 feet for every foot of fall. 7,000 in use.

Write For Free Plans and book of valuable suggestions.

RIFE ENGINE CO.
2166 Trinity Bldg, New York



$1,000 Reward

for its equal. Wind power doubled. Two 14 ft. wheels work on same pinion; second wheel gives more power than first.

A Governor That Governs in all winds. Develops 10 full h. p. in 20 mile wind. All power needed for farm, shop, irrigating, etc. Ask about our self-oiling, self-governed, single wheel pumper—also Admiral Husker. Ask for book 60

DOUBLE POWER MILL CO.
Appleton, Wis., U. S. A.

Larimer Ditching Plow

with subsoil attachment. If you have ditching to do, this plow will save you more money than any implement you have on your farm. Reduces cost of digging ditch from one-half to two-thirds. Send for descriptive circular.

LARIMER MFG. CO.,
EOLA, (near Chicago,) ILL.

"ROCKFORD"

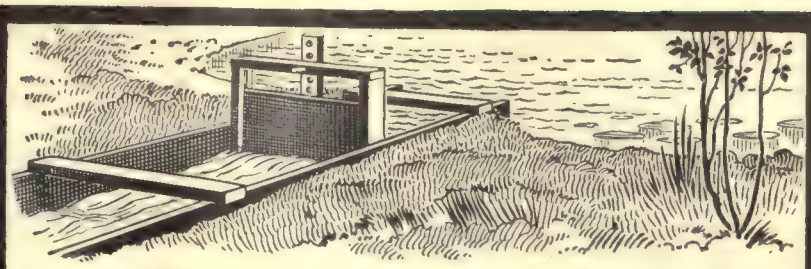
ROCKFORD ENGINES—ALL STYLES
From 3 to 30 H. P.

Before you contract or buy, get the Rockford proposition. Address Dept. 4, Rockford Engine Wks. Rockford Ill.

Rockford Girl is the engine that will please

Neat—Nobby—Handy

"ROCKFORD"



IRRIGATE FROM YOUR OWN RESERVOIR

A reservoir on your own land makes you independent on the water question. You will have no trouble in filling the reservoir during the spring rains, when all the streams, little and big are flooded.

Then you will not be at the mercy of ditch owners and other water users when the dry season comes.

The few acres you will require for the reservoir will not be wasted. They will serve to make all your other lands vastly more valuable.

Raise the Water With An I. H. C. Gasoline Engine

Of course you cannot have your reservoir on your high ground. Locate it on the bottom land where it is easiest made and certain to be filled with drainage waters.

Then pump the water wherever you need it with an I. H. C. gasoline engine.

These engines, always powerful and reliable, have been found to be excellently adapted to irrigation pumping.

They are operated with little expense. They require but little attention.

They enable you to utilize the waste waters such as deep streams, sloughs and ponds upon your own land.

The farmer who has a water supply of his own, so that he may irrigate a few hours now and again, without regard to whether the water is flowing in the company ditch, is the independent farmer.

A reservoir on your own land and an I. H. C. gasoline engine to give you the water when you want it, where you want it, is the solution of the problem.

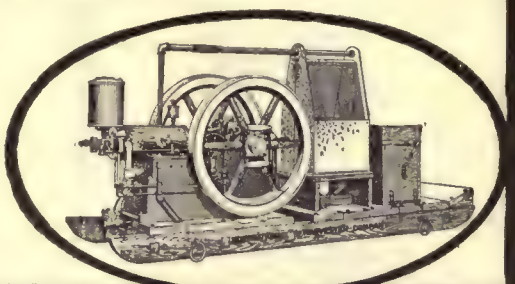
The I. H. C. gasoline engine can be used for other purposes beside pumping. It is a general purpose engine, which will be found an all around handy farm helper—to run grinder, sheller, separator, fanning mill, washing machine, churn, grindstone, etc. The I.H.C. line includes besides Famous pumping engines and jacks, the following:

Stationary engines, from 1 to 25 horse-power; Portable engines, from 2 to 20 horse-power; Skidded engines, from 2 to 8-horse-power; Tractors, 12, 15 and 20-horse-power, and Sawing and Spraying outfits.

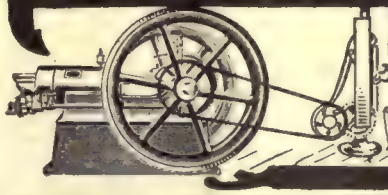
Call on the International local agent for catalogs and all particulars in regard to these engines, or write nearest branch house.

WESTERN BRANCH HOUSES:
Denver, Colo.; Portland Ore.; Salt Lake City, Utah; Helena; Montana; Spokane, Wash.; San Francisco, Cal.

INTERNATIONAL HARVESTER COMPANY OF AMERICA
(Incorporated)
CHICAGO, U. S. A.



PUMP WATER



PUMP 1000 GALLONS OF WATER FOR ONE CENT

Every farm should have one of our pumping plants. Unlike a windmill it always works, wind or no wind, and costs less for repairs. Plenty of water in a minutes time.

WITTE GAS AND GASOLINE ENGINES

Suitable for wells, any depth, and for irrigation. Guaranteed 5 years. Write stating size wanted.

WITTE IRON WORKS CO.
505 W. Fifth Street KANSAS CITY, MO.

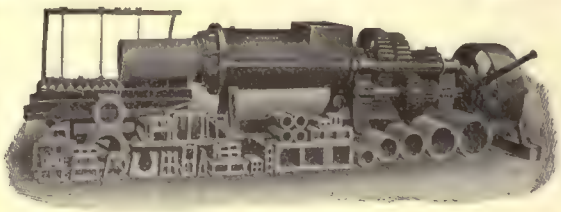
Reason Says: "Clip Horses"

In the Spring = *They look, feel and work better, clean easier, and if for sale bring more.*

The Stewart No. 1 Ball Bearing Clipping Machine

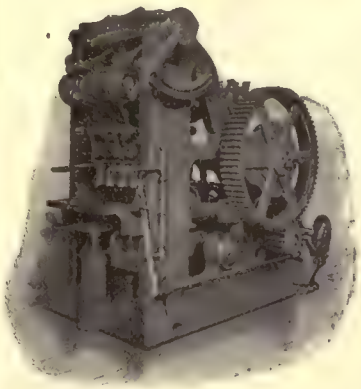
Is the best on earth at any price. Ball bearings, file hard cut steel gears. Runs easy, clips fast, lasts long. **Guaranteed for 25 Years.** Only **$7.50** at dealers, or send $2.00 and we will ship, balance C.O.D. Write today for free big new catalogue.

Chicago Flexible Shaft Co., 86 LaSalle Ave., Chicago



Centennial Auger Machine

Mascot Auger Machine



Dry Press, 5 styles

Wheelbarrows and Trucks

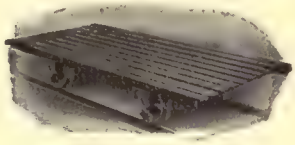
Clay Working Machinery

"BUILT RIGHT—
RUN RIGHT"

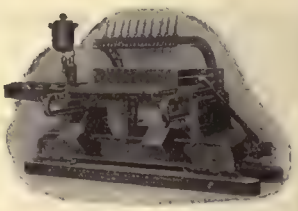
We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

The American Clay Mch. Co...Bucyrus, Ohio

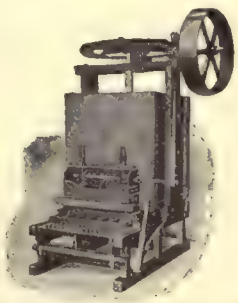
Eagle Repress



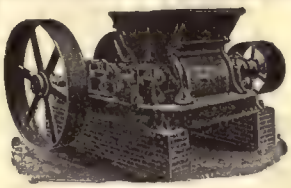
Dry Cars, all kinds



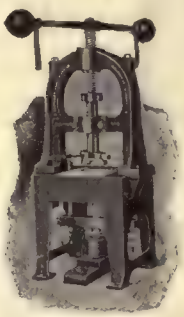
Hand and Power Cutters



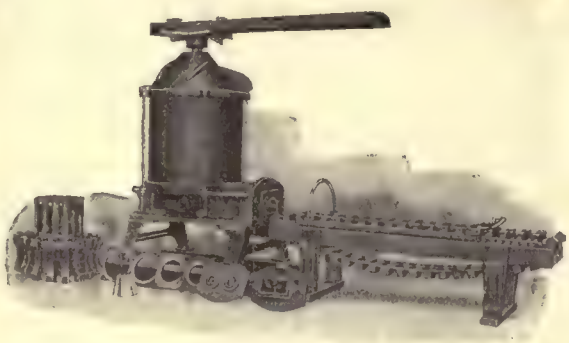
Soft-Mud Machines, Horse and Steam Power



Disintegrators



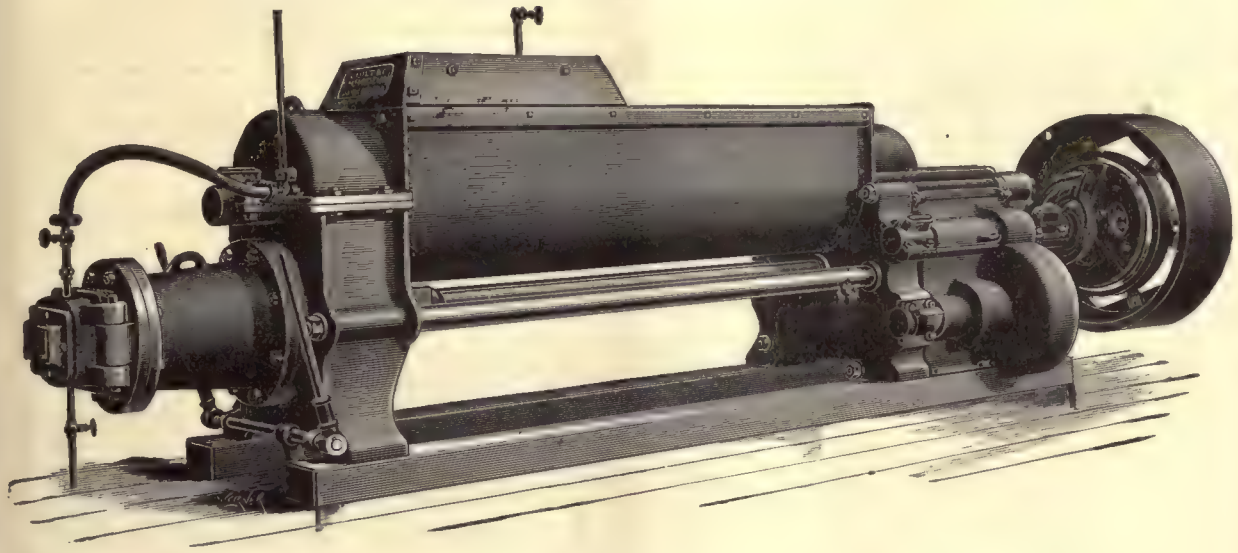
Hand Power Screw Press



Horse Power Plunger Machine

Products of our Auger Machines

UNION MACHINES
WITH PUG MILLS COMBINED



FIVE SIZES ALL CAPACITIES

Outfits for Drain Tile, Hollow Ware, Building and Paving Brick and other Clay Products

If interested write us for particulars and estimates.

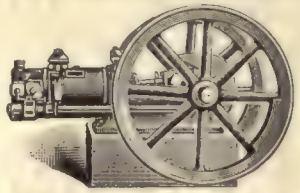
E. M. FREESE & CO.
GALION, OHIO

Send $2.50 for The Irrigation

Age one year and

The Primer of Irrigation

Otto Suction Gas Producers
And Otto Engines
Are Reliable and Can Be Operated By Men of Ordinary Intelligence



J. A. Witter, Engineer for the Beaver Crossing Electric Light & Power Co., Beaver Crossing, Nebr., writes:

"Please send me a book of instructions on handling and running your gas producer and engine. I have been running this one on horse sense, but that might not work at all times. Plant works fine.

This man without special instructions, but with the use of "horse sense" causes his plant to work fine. There is a volume of praise for "OTTO" machinery in Mr. Witter's short letter.

The Otto Gas Engine Works
Philadelphia, Pa.

It's Easier Quicker Cheaper

To Level Fields, Make Ditches Cut and Clean Laterals, Make Borders

with our 20TH CENTURY GRADER. Cuts "V" shaped ditches 30 in. wide, 15 to 18 in. deep, once up the field, once back; if ground is mellow—no plowing. It is light but very compact and strong. Weighs 600 lbs. Can set reversible blade at any angle up to 50 degrees. Can raise and lower it, little or much, from seat, in a second. Blade 6 ft. long. Machine all steel except tongue. The

20th Century Grader

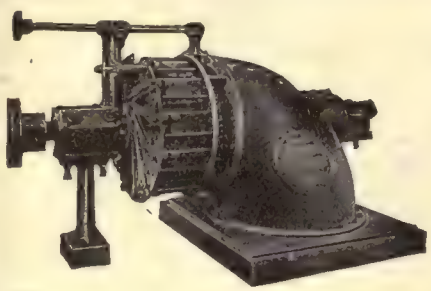
levels seed-beds, cuts sage-brush with special attachment, shaves down hummocks, digs shallow or deep ditches, grades roads, etc. Write now for newly written, handsome catalog with brand-new photos. It will answer your quest ons and make you want a **20TH CENTURY GRADER.** Address today.

THE BAKER MANUFACTURING COMPAN Y
277 Dearborn Street
CHICAGO, ILL.

Oxford Hotel
DENVER, COLORADO

At the OXFORD HOTEL, Denver, Colorado, you will find all the leading men interested in irrigation and all of its branches.
Denver is the logical irrigation center of the United States. You will find nearly everyone engaged in or interested in irrigation projects stopping at the Oxford Located half a block from the Union Depot: Fire Proof, Modern, European Plan and Popular Prices

THE HAMILTON-BROOKS CO.
PROPRIETORS



SAMSON TURBINE

When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the HIGH SPEED of the SAMSON, for a given power, lighter and consequently CHEAPER transmission machinery can be used.

JAMES LEFFEL & CO., Springfield, Ohio, U. S. A.
Write Department K-2 for Catalog.

ECKERLE

"The Piano with a Soul"

"SOLD—when You're SATISFIED"

That's the way Eckerle Pianos find homes for themselves.

OUR NEW 60-PAGE ART COLOR CATALOG

will be sent free and postpaid to you if you ask for it. Then in the quiet of your own home you can, by means of these beautiful photographs and complete descriptions, read and learn just how **well** Eckerle Pianos are made, why they stay in tune so long; why they last a lifetime; why they always satisfy, and why it is called the "Piano with a Soul." This book takes you on a trip through one of the largest and best equipped piano factories in America, and explains clearly why Eckerle Pianos are **better** than other moderate price instruments. There are thirty-four of these important reasons which you should know about, scattered along the journey from lumber yard to shipping room. Send for this Art Color Catalog today. It shows our new 1908 styles in colors, quotes lowest freight-paid prices, explains our 4 different plans of payment, and tells you in the words of other buyers just what they have found the Eckerle Piano to be.

After you have read this book

through and talked the matter over with your family, you can take advantage of our fair and square **"Sold when you're satisfied"** offer, and we will deliver to your own home, freight and delivery charges paid, the style of Eckerle Piano you prefer, and let you give it a thorough 30 days' trial. Play it yourself; let your children try it; invite your musical friends to play on it, and when the 30 days are up, let us know whether the Eckerle—"The Piano with a Soul"—has found a home with you. You take no risk whatever in trying the Eckerle Piano in your own home, and we take but very little risk in making you this offer if you are really seeking earnestly for the best piano at a moderate "Factory to Home" price. Write a postal or a letter right now and ask us to send you the Art Color Catalog of the Eckerle—the piano that is not considered sold until you are fully satisfied that it is **the piano you want to place in your home.**

ALBAUGH-DOVER CO.
903-938 Marshall Boulevard
Capital $1,500,000 CHICAGO, ILL.

ALDOCO STEEL WIND MILLS

Only $37.40 and up for complete steel mill and steel tower. Aldoco Mills run smoothly, quietly, and easily, and require but the slightest breeze to set them in motion. They have solid tool steel wrist pins, and a special Rocker Arm Device. Our steel towers are strongly braced, well proportioned and fitted with ladders. Every mill fully guaranteed. Write us.

No. 13 D I A-7701-11.
Complete 8-foot wheel and 30-foot tower, total weight 940 pounds. Price.....$37.40

No. 13 D I A-7701-12.
Complete 8-foot wheel with 40-foot tower, total weight 1130 pounds. Price.....$43.85

No. 13 D I A-7702-20.
Complete 10-foot wheel with 40-foot tower, total weight 1260 pounds. Price.....$51.65

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Complete 10-foot wheel with 50-foot tower, total weight 1600 pounds. Price.....$60.65

ALL SHIPMENTS MADE FROM FACTORY NEAR CHICAGO

ALBAUGH-DOVER CO.
913-938 Marshall Blvd., Chicago, Ill.

NEW ALBAUGH-DOVER MODEL 5D-12 SEWING MACHINE

90 Days Trial

A $60.00 Machine From Factory to Home for $17.95

The most wonderful offer we or any other house has ever made on a strictly highest grade ball bearing drop head sewing machine. Do not class this machine with the ordinary drop head sewing machines which you can buy anywhere at $25.00 to $35.00. At $35.00 this machine would stand alone as one of the greatest values ever presented, and now when we cut the price in two and ask only $17.95 for this beautiful piano-polished quartered oak case, with carved front and round corners, and this high arm automatic head fitted with best ball bearings and equipped with stitch regulator, double feed, spring tension, cylinder shuttle and automatic bobbin winder, also include a full set of attachments and accessories, the offer becomes the sensation of the season in sewing machine values. You don't need to take our word for it, but trust to your own judgment after you have tried the machine in your own home for 90 days. Order this machine on 90 days trial; use it alongside of any $60 Agency Machine made, and if you don't prefer the new Albaugh-Dover model No. 5D-12 machine, regardless of cost, send it back and get every cent of your money. You take no risk whatever. We can make quick shipment Order today on 90 days trial. **PRICE $17.95.**

Albaugh-Dover Co., 905-938 Marshall Blvd., Chicago, Ill.

MORE MONEY
From Your Cows and Much Less Work In Getting It.

If you could see the Real "DIFFERENCE" between the NEW BUTTERFLY CREAM SEPARATOR and any other made—**Difference** in amount of the cream you get; **Difference** in the quality of cream; **Difference** in the way the machine runs. **Difference** in the number of times a minute you have to turn the crank; **Difference** in the way the milk is aerated and purified while being separated; **Difference** in the time and trouble it takes to clean the skimming device—you would say, as hundreds of others are saying today—"I'll get the NEW BUTTERFLY CREAM SEPARATOR."

If you could see how to make easily $10 to $15 more a year on each and every cow you keep, and still do it with less work for your wife and yourself, you'd say: **"I'll get a Cream Separator."**

OUR PATENTED ALUMINUM CORRUGATED SKIMMING DEVICE

makes the New Butterfly Cream Separator **different** and **8 times as efficient** as any other machine. Every drop of milk that enters the bowl of the New Butterfly Cream Separator is actually put through the skimming process **8 times.** This guarantees complete separation, and you can't fail to get **ALL THE CREAM.** New Butterfly Cream Separators are sold as they ought to be. Not by agents, but direct from our factory to your farm **Freight paid and on 365 days' trial.** Send today for illust'd catalog.

For average use, we recommend ***No. 4½****, capacity 450 to 500 lbs. of milk per hour.*

PRICE delivered at your town— **$39.80**

ALBAUGH-DOVER CO. Capital $1,000,000
925-938 Marshall Boulevard, CHICAGO, ILL.

A Complaint

from one of the largest buggy manufacturers in America.

In a private letter recently addressed to the Albaugh-Dover Company he makes this complaint, and appeals to us to raise our buggy prices.

"Your prices are too low. We do not believe there is any other catalogue in existence (and surely no retail dealer or agent) selling a buggy as well made as your 14D-116, for instance, for less than $60.00, while your price is $50.00."

We call that a pretty convincing argument, and one that should mean more to you if you are going to buy a buggy, than all the extravagant claims made in the most beautiful colored catalog ever written. This letter proves that when it comes to buggies, **we are acknowledged privately by other manufacturers themselves to be leaders in price and quality.** Why shouldn't we tell you about it? You ought to know it, too.

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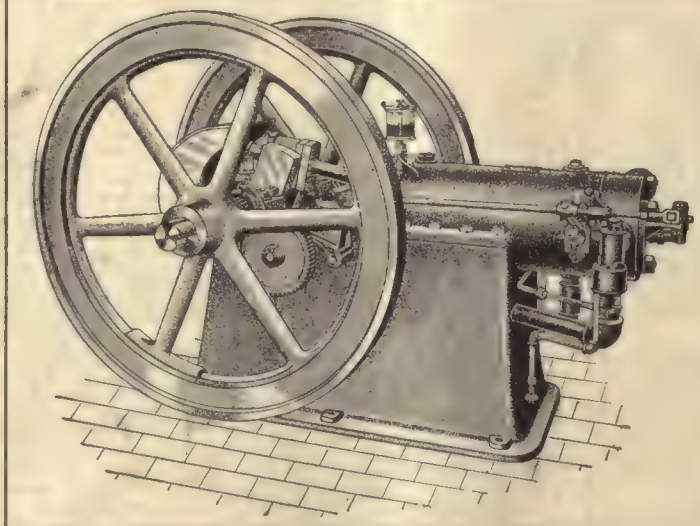

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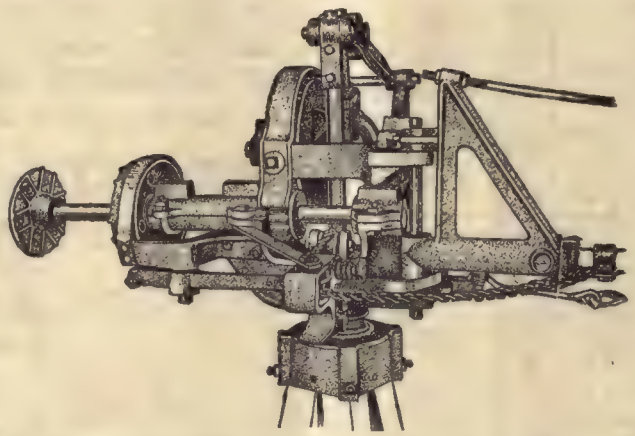

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VOL. XXIV. CHICAGO, MARCH, 1909. NO. 5

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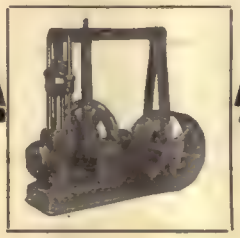

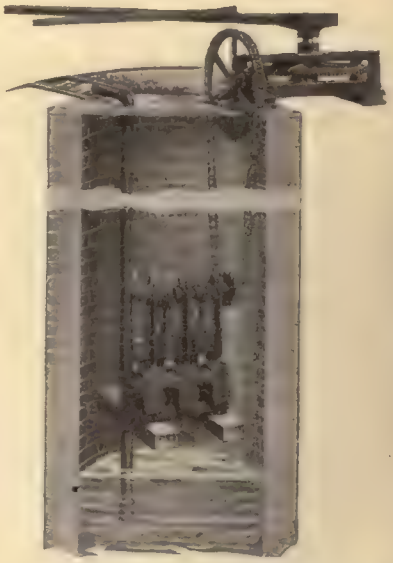

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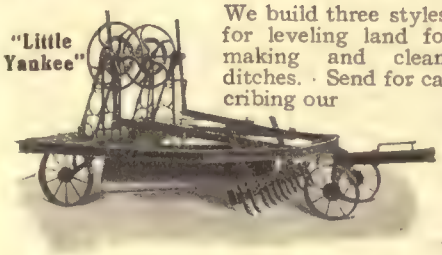

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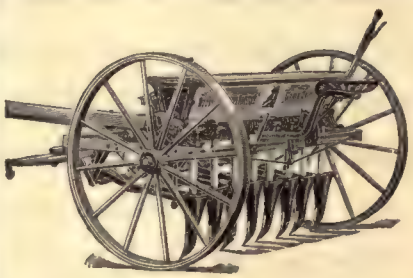

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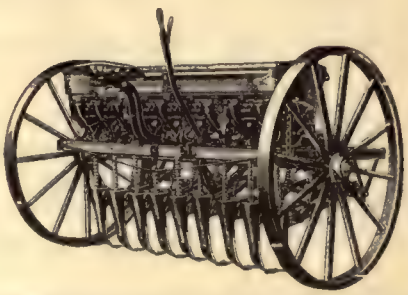

THE IRRIGATION AGE

VOL. XXIV CHICAGO, MARCH, 1909. NO. 5

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION — THE DRAINAGE JOURNAL
THE IRRIGATION ERA — MID-WEST
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D. H. ANDERSON, Editor

ANNOUNCEMENT.

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Idaho Forestry Association.

Northern Idaho Forestry Association, composed of lumbermen of Washington, Idaho, Minnesota, Wisconsin, Iowa and Nebraska, owning hundreds of thousands of acres of virgin forest lands in the panhandle of Idaho, will urge the forestry department, headed by Gifford Pinchot, to co-operate with it in the protection of the standing timber, including several hundred thousand acres in the national forest reserve, declared to be the largest stand of white pine left intact on the continent. The association expended more than $100,000 this year in building trails, maintaining stations and patrols and fighting forest fires.

It is purposed to build a series of twenty dams at the headwaters of the Coeur d'Alene, St. Maries and St. Joe rivers and their tributaries to create enormous reservoirs to store the snow water from the mountains for release during the dry season. This will provide a means to fight fires, insuring also a steady flow in the streams for logging, irrigating and mining purposes and checking the floods during the spring freshets, thus eliminating the danger of the destruction of millions of dollars' worth of property by the ravages of swollen mountain streams.

A. L. Flewelling of Spokane, chairman of the committee on conservation, will leave for Washington, D. C., early next year to discuss the matter with Mr. Pinchot and endeavor to enlist federal aid.

American Irrigation Federation.

The American Irrigation Federation, which has vice-presidents and members in every state and territory where water is applied to lands by scientific means, will meet in annual convention in Spokane on August 8, the day before the seventeenth National Irrigation Congress is formally organized.

G. L. Shumway, of Scottsbluff, Neb., chairman of the executive committee of the federation, conveys the foregoing information in a letter to R. Insinger, chairman of the local board of control of the congress, at Spokane.

Mr. Shumway adds it is likely that the governor of Nebraska and a representative delegation of men interested in reclamation and forestry in his state will attend the congress. He urges that advocates of private irrigation enterprises, the Carey act and other matters of similar character and scope be given a hearing, saying that the good points of all are certain to be brought out in spirited debates.

The officers of the federation are: President, L. Bradford Prince, Santa Fe, N. M.; secretary, D. H. Anderson, editor IRRIGATION AGE, Chicago; vice-presidents, Presley E. Horn, Hailey, Idaho; Prof. J. D. Tinsley, Mesilla Park, N. M.; Tom Richardson, Portland, Ore.; Judge Cyrus Happy, Spokane; C. T. Johnson, C. E., Cheyenne, Wyo.; Prof. O. V. P. Stout, Lincoln, Neb.; Prof. F. D. Coburn, Topeka, Kas.;

William Hale Thompson, Chicago; John Hall, Lampassas Springs, Texas; A. J. Cobban, Rhinelander, Wis.; executive committee, Lute M. Wilcox, editor *Field and Farm*, Denver; Zera Snow, Portland; J. Turley, Turley, N. M.; C. E. Brainard, Payette, Idaho, and John McAlpine, Duluth, Minn.

Attempt to Change Name.

In a recent news item we notice that there is a sentiment among engineers connected with the Reclamation Service to boost the Water Resource Branch of the United States Geological Survey. We note that one engineer, Mr. J. C. Stevens, of Portland, Ore., is either working in conjunction with Mr. Pinchot of the Forestry or Conservation movement or some others in his own department who are anxious to put over the conservation matter, but it is doubtful if a man in Mr. Stevens' position would attempt to suggest as important a change as that which is described hereafter. In his recent letter to one of the officials of the Irrigation Congress, Mr. Stevens says that the Congress can render the greatest service if it will make a specialty of favoring the conservation movement, which is today so much alive in the public mind. In fact, he favors changing the name from the National Irrigation Congress to the National Conservation Congress, because, as he says, this organization in the past has taken up the questions which have led to the necessity for that broad view of the subject which would be embraced in a conservation congress, and he furthermore says that he believes the organization is now a conservation congress in everything except the name.

Mr. Stevens would better apply his efforts directly along lines which would be beneficial to his part of the work rather than the exploitation of suggestions handed to him by his superiors or officials of the Forestry Bureau.

An attempt was made at Colorado Springs by Geo. H. Maxwell and some of his friends to merge the Irrigation Congress with the Trans-Mississippi Congress and it is very evident from the suggestion which comes to us through Mr. Stevens that some move of this kind will be attempted at Spokane.

These gentlemen, who by the way are nothing more than the servants of the people whom they are trying to lead, may as well understand, first as last, that the Irrigation Congress was not organized for their benefit and that its object today is to give an opportunity for the exploitation of such grievances as may arise in connection with the reclamation of our arid lands, in addition to the discussion of matters pertaining to irrigation generally.

The Forestry matter has grown sufficiently to hold the attention of any one government bureau without there being necessity for branching out into the subject of water conservation.

One is inclined to think at times that Mr. Pinchot has "gone wild" on this subject. He may as well understand, at this time, that the west will not continue to tolerate his arrogance and dictatorial policies.

What effect the new administration will have on this policy it is a question. It may as well be stated to these people, however, that they will change the political complexion of the entire mountain section, as suggested by Mr. Robertson of Wyoming, unless their policies are modified to meet the conditions arising from agricultural development alongside of forested areas.

The public, generally, do not apparently comprehend this question or they would rise en masse and destroy the power of the forestry bureau. One of the most alarming features in connection with this whole work is the fact that such estimable men as Secretary Wilson sit idly by and permit encroachment on the rights of settlers, farmers and stockmen throughout the west.

And what is this man Pinchot, who is allowed such power and control? One would judge from his actions that he has the whole federal machinery at his command. Perhaps on some of his rare trips away from the lines of railway he has gathered some of the far-famed loco and fed it to some of those in Washington who are now his dupes and supporters. "Locoed" would be a fairly good explanation of the condition of those who are apparently following the suggestions made by the man Pinchot. We wish at this time to reiterate Mr. Robertson's prediction that the whole political complexion of the mountain states will be absolutely changed unless radical moves are made along conservation and forestry bureau lines in the way of improvement and assistance to the home-maker.

National Irrigation Congress.

The meeting of the seventeenth National Irrigation Congress in Spokane, August 9 to 14, 1909, comes at an opportune time, and in all probability the matter of reservoirs and dams in the mountains will be taken up with the irrigation men, who will also be directly benefited by the hoarding of the water supply. It is understood that President Taft and several members of his cabinet will attend the sessions, going afterward to Seattle to visit the Alaska-Yukon-Pacific exposition. It is also expected there will be from 3,500 to 5,000 delegates and visitors, including prominent irrigationists, orchardists, forestry experts and others interested in the subject of irrigation.

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EDITORIAL NOTES.

BY G. L. SHUMWAY.

The Farm Life Uplift Commission has reported, and, as predicted, the amount of information collected which is of practical use is not emphasized by the amount given out. As stated, the indorsements are for those things for which the commission was created. The purpose of its creation was political and it has fulfilled its mission.

The indorsement of postal savings banks was anticipated in these columns and elsewhere. But let me say here that I do not strenuously object to postal savings banks if they come into being through the enactment of a bill embodying Senator Carter's ideas, but if along the lines of Mr. Meyers' opinions, it will place monetary matters in the hands of fewer people.

The main objection to Senator Carter's plan lies not in the plan itself, but in its practical operation when coupled with the asset currency law. Under that law all bonds that are a basis for currency must pass inspection and obtain the official O. K. of a monetary commission. To become a federal depositary a bank must first find satisfactory bonds to deposit in the United States treasury. Those bonds must be acquired either from the people or from bondholders in the money centers.

The commission can discriminate. In fact, it must discriminate, and quite likely the kind of bonds —industrials and transportation bonds—with which its members are familiar, will be favored. While irrigation bonds, which are probably the best and safest kind of bonds in existence, are as likely to be rejected, because the commission lacks information along irrigation lines. Every seed sown, every improvement made, every furrow plowed, every mortgage filed, in a community embraced in an irrigation district, adds to the strength of that district's bonds, yet they are likely to be the first in the list to be blue-penciled. So if the outer circles must send to the industrial centers for their bonds it will drain local communities of just the amount of its available life blood.

But this is a digression. I started in to scold, and I fear that the continued irritations will cause me to degenerate into a chronic scold. From the hundred-and-some-odd-thousand letters received one is given conspicuous notice. It is an unfortunate faculty of Mr. Roosevelt to seize an exception and hold it up as the rule. In this letter, one man asserts that he counted seven snakes in the wall of a neighbor's well, and apparently this illustrates the carelessness of country people as to sanitary matters.

This "snake story" evidently impressed the commission also. If its members were "Beard"-less, as boys, or were of that class of women whose sympathetic souls melt with pity when they go slumming, one would not be surprised. These supposedly sensible men were evidently slumming also, and because of such an isolated case (if indeed it existed) their scintillating imaginations painted serpents galore invading the Edens of our farming communities. It would be singular (if it were not plural) this tendency of the closing administration for wildly extravagant illustrations.

My earliest childhood was upon a farm where the pink petals of peach and apple blossoms fell into my cradle. The stretching fields of corn, grains and meadow of sweet scented hay were my associates of youth and early manhood. I exchanged work with neighbors for miles around, and took my turn with the downrow and the tail of the straw carrier. The labor was hard and the hours were long, but the food was good and clean. Once in a while an old toad would drop into our open wells, but was immediately discovered and the well drawn dry and cleaned, but I never yet saw or heard of a snake in a well until unearthed by this slumming commission.

I have wandered all over the great west. I have lived in dugouts and cabins, but everywhere in the rural world has cleanliness been one of the dominating features. When the high winds roared the wise old country women found comfort in the thought that it made the country healthier. Seldom would a woman of the farms think for one moment of mingling the garments of her flock indiscriminately with others as is now done in many laundries. No, her proud moments are when, white and clean, washed by her own hands, a laden line hangs under the light of the sun, the snow white flag of cleanliness, and a refutation of this seemingly wanton insult by inference at least.

To continue this joke of a report the commission solemnly warns the farmers of the great agricultural states, where waterfalls are not of frequent occurrence, that the monopolization of water power will overwhelm them with some dire calamity. Power from most of the streams in the greater part of the agricultural states is impossible to any great extent, but the few old mills that are so operated appear to me to have converted a waste energy into useful channels, and the perpetrators of the deed are entitled to medals, or some such recognition.

Farm life commissions and conservation commissions are all right in a way if they would get down to business and not draw so heavily upon their vivid imaginations. The rural population needs actual, prac-

tical, agricultural instruction in our public schools. The country needs not be told that it shall not use the natural advantages and resources that it possesses, but how to create new resources. As an illustration, there lives in Nebraska a man who today is building himself a barn—*of lumber made from trees planted by himself.* That is utilizing the elements to make the things which we need.

The new idea seems to be that if a man takes a tract of virgin soil, and by the aid of sunlight and rainfall, or irrigation, his industry and ingenuity create a home, he is justly a victim of tribute. That men who for years have watched the waters of a river flow past their doors, have a right to absorb a portion of the profit resulting from the industry and genius of a man who converts that waste into useful purposes. Perhaps this is right and that indolence has a just privilege to fasten itself to meritorious enterprise, and be supported by the energy of others.

Conservation Problem.

We are presenting in this issue an article on the Conservation Problem by Mr. Clarence T. Johnston, State Engineer, of Wyoming, which will be found very interesting to those who are devoting time to the study of this subject.

Mr. Johnston is one of the best known engineers in the entire western country, is a man of great ability and good standing in his home state, and his views on this subject may be accepted as authority.

LIGHTEN TAX FOR IRRIGATION.

The fact that irrigation works have generally proved to be more expensive than estimated, with the attendant increase in burden of annual payment required of the entrymen under the act of July 17, 1902, has caused Senator McCumber of North Dakota to introduce a bill providing that such payments shall be made in twenty installments.

In North Dakota the installments required under the present law are as high as $4.60 per acre, so that an entryman with forty acres is obliged to pay as much as $200, while as a rule he doesn't obtain irrigation for more than half of his land.

When the irrigation works were projected it was not supposed the charge would be so great, and it was expected the result would be to give ample water for all the land involved in the project. North and South Dakota, Arizona, New Mexico, Idaho, Colorado, Montana and Utah are all affected by the proposed legislation, which is now before the senate committee on irrigation and reclamation.

Send $2.50 for The Irrigation Age one year and The Primer of Irrigation

THE CONSERVATION PROBLEM.

BY CLARENCE T. JOHNSTON,
State Engineer of Wyoming.

*Read before the Wyoming Wool Growers Association at Rawlins, Wyo., Jan. 11, 1909.

A state is created when the people locally concerned are able to convince Congress that, by reason of population, education and natural wealth, a particular territory is entitled to this more advanced and independent form of government. Congress, in which all states are represented, would not assume to diminish the area of any state without the consent of the people of that state. Yet this has been done regardless of the will of Congress, or the interests and necessities of the people concerned.

Western states were formed under the theory that development would take place within their borders as it has in Iowa and Minnesota. The same laws, with but little change, are now in effect. Without consulting Congress, or the representatives from the West, immense areas have been withdrawn from the operation of the land, mineral and timber statutes. On the recommendation of one great conserver all the timber lands are removed from the sovereignty of the states and he is made absolute lord and master of them. Another advises that the coal lands be withdrawn from all other forms of entry. This advice seems good, and the coal lands are partially taken away from the general land office, which is supposed to have charge of them under acts of Congress, and given to another department which is strong on conservation. Some clerk drifting about here in the West found that there is a large area underlaid with phosphate. To insure his name being inscribed upon a tablet among famous men, he recommends that these lands be set aside and relieved from the operation of the laws enacted by Congress. Some true lover of game and birds discovers a place that would make an ideal breeding ground for some of these animals. He places himself among the great and good by having such lands reserved. Among all of these withdrawals, not a single acre except a small area that will actually be irrigated under government projects has been set aside for the benefit of the people. We do not know why coal lands are withdrawn, as such, when no study has been made to determine whether or not the coal below can ever be of one-half the value of the sage brush which flourishes on the surface. It would not surprise one to find, in a few years, that some distinguished scientist has discovered that sage brush has great value. As soon as it is clear that this great resource of Wyoming is likely to be needed by posterity, sage brush reserves will be created. When that time arrives our state will cease to be a commonwealth among those of the Union. Already one-third to one-half of the area of the state has reverted to the national government by proclamation of the President. What is left of the public domain may at any time be withdrawn, so that the state will only be sovereign over the small area of land that has gone into the hands of the people.

Our present situation is not a pleasing one. We are told that these great withdrawals are made to protect the interests of the people. We had supposed that Congress represented the people and that laws were made governing the disposition of all public lands. This being true, it would seem natural that Congress should

enact laws providing for a proper administration of all other resources. With every department grasping for power and seeking jurisdiction over resources of various kinds, and land withdrawals taking place every few months, we can well take time to pause and ask ourselves whither we are drifting.

We have failed to grasp some opportunities in the past which might have placed the states in position at this time where interference by the bureaus at Washington would not be possible. Because we were then, as now, grazing our flocks and herds without charge, our selfish instinct opposed state control of the public domain. We were afraid that the state might deem it wise to divide the range and protect the stock business, and that the expense of this administration might have to be borne by the live stock interests. We lost a great opportunity and now face a danger which did not threaten fifteen years ago. We must now deal with bureaus hundreds of miles away, which cannot be reached by reason and whose policies cannot be modified to suit local conditions.

We live in the age of the advertiser. Those who have wares to sell or who for any other reason have cause to bring matters to the attention of the public, have learned the value of the art of advertising, and have found that the catchy phrase is one of the best means for reaching the desired result.

Advertising is excusable on the part of merchants or professional men, because these must compete with others who are in the same line of business. To carry methods which are necessary among the commercial relations of men to places of trust and responsibility where there is no competition and where scientific work only is to be performed, is a dangerous policy in a government of the people.

The Forest Service of the United States is a creature of advertising. The millions appropriated by Congress each year are partially dissipated in carrying on a very complete publicity department. We presume that the people of the East, who read most of this advertising, believe that the Forest Service is planting trees, and doing everything on the great reserves in the West to protect the present growth of timber and to insure an ample timber supply in the future. We who understand forest reserves also understand that they are conducted primarily for the purpose of revenue. This revenue was formerly used directly by the Forest Service. Now it is deposited in the United States Treasury and one-fourth of it is supposed to return to the state in which the reserves are located. The larger this revenue becomes, the stronger becomes the arguments of the Forest Service for larger appropriations from Congress. With each increase in the appropriation the advertising resources of the Forest Service can be extended. The writer has obtained the printed advertising of the Forest Service for a considerable period and as yet has not found a single instance where anything new in the science of forest work has been described therein. The advertising deals with persons and policies.

The familiar and gloomy picture so often presented by the Forest Service that our forests will disappear within twenty years if the present use continues, is an example of some of the stock advertising indulged in by this Department. It is intended to bring converts to the policies of the Forest Service by leading the public to believe that the timber supply is likely to be insufficient within the next few years. With trees growing throughout the country; with a timbered country extending from the Canadian borders to Alaska and from Mexico through South America, there is no cause for any great worry in this direction. Lumber from South America and British Columbia can be laid down at our principal seaports at a price that will compete with any of our domestic timber.

Forestry, like any other kind of agriculture, will always be maintained in accordance with its value to the people concerned. No one should endeavor to minimize the value of trees and forests. No department of the Government should take advantage of the natural disposition of the people to embrace policies which will guarantee the success of any agricultural pursuit, for personal or political purposes.

A year ago Congress passed an Act, in connection with the appropriation for the Forest Service, which reads as follows: "That no part of this appropriation shall be paid or used for the purpose of paying for, in whole or in part, the preparation or publication of any newspaper or magazine article, but this shall not prevent the giving out to all persons without discrimination, including newspapers and magazine writers and publishers, of any facts or official information of value to the public." This seeming restriction of the advertising work of this Department has seemed to encourage rather than discourage the officers of the Forest Service.

A weed pulled up by the roots cannot survive. If cut off, leaving the roots in good condition, it may thrive more luxuriantly than though it were left in its original state. It would seem that this Act of Congress, in an attempt to curtail vicious advertising by a scientific department of the Government, which should stand on the merit of its own work, has given such treatment to that department as does the farmer who removes the top of a sunflower without injury to the stalk of the plant. After such treatment the sunflower branches out and flourishes like a green bay tree. Since the Act of Congress a year ago, the Forest Service has not only continued its own campaign, but it has branched out and is responsible for the Conservation Commission, and the Commission to study conditions of country life.

The advertising issued in behalf of the various commissions has attached to it a colored slip of paper one-half of which contains the law restricting the use of the appropriation for advertising purposes, and the other half is a frank addressed to the Forest Service at Washington. The law is quoted to deceive the public, because it would not be presumed that any department would quote a law while in the act of violating it. The frank is for the purpose of returning to the forester any papers which may publish advertising matter free of cost. The Conservation Commission is therefore an offshoot of the Forest Service. We do not know as yet what this new branch of the Forest Service is to bring about. We do know that it is flourishing under that successful system of advertising inaugurated by the chief of that service. We do not know as yet how we are to actually conserve our resources except by failing to make any use of them.

When the pilgrim fathers landed on the bleak coast of New England they were not restricted in the use of any resources at their disposal. They grazed their herds and flocks on the lands that were held in common and their prosperity and progress was largely due to the

freedom they enjoyed in this direction. As settlement has continued westward, the pioneer has always been favored with the free use of all resources which could not be ultilized to better advantage under some kind of community control. This happy condition continued throughout the time occupied in the settlement of an area comprising two-thirds of the public domain. A time finally arrived when large interests that are protected by some of the bureaus at Washington found it to their advantage to restrict settlement and by a policy of preservation and conservation increase the value of their own holdings. Some of the bureaus at Washington have co-operated with these large interests and are still, we believe, carrying on campaigns in conjunction with the publicity departments of some of the most powerful interests of the country.

The people of the West appreciate fully the necessity of making a proper use of natural resources. They understand fully the problems which are presented and which must be solved before development can take place and before the best use of resources is realized.

When the pioneer of the West endeavors to prevent some waste by running livestock on an area embraced within the forest reserve, thereby consuming some of the grasses which grown each year, the officers of the Forest Service hold that he should pay the general Government in the proportion to your grazing privilege. The grass which grows this year and dies in the fall is as much lost to the public as the water which has passed down our rivers to the larger streams of the Atlantic and Pacific. While public rights should always be preserved, yet those who develop and those who are the pioneers in any industry should not be taxed until the time arrives when a higher and better use can be made of any resource and when such use is necessary in behalf of local public interests. The tax on the use of a natural resource should, therefore, be applied when competition demands such a regulation.

It can be said without fear of contradiction that the present attitude of the Forest Service would have been impossible had it not been for the widely circulated claim of beneficial effects of forests which have no basis in scientific truth. For years the Forest Service has been advertising that forests conserve the water and regulate the flow of streams. During the past year several prominent engineers of the West have taken up the question of forests and their influence on stream flow. These men agree that forests do not have a favorable effect on the run-off of streams. Colonel H. M. Chittenden, of the U. S. Corps of Engineers, takes a leading part in this discussion. His observation and investigations have covered a long period and his work has been of the most careful and painstaking character. He has spent much time in the forest areas of the West and can speak from a knowledge based on actual experience. His paper was subject to severe criticism by those who had accepted the theories of the Forest Service blindly, but Colonel Chittenden's arguments were not thereby weakened in a single instance. A prominent California engineer was among those who followed Colonel Chitenden and he shows by actual measurement of streams that those with the forest covered water shed, other conditions being equal, furnish less water per annum than streams which have their source in localities growing no timber. Not only is the volume of water greater from streams belonging to the latter named class, but the season of high water is more timely and the floods are less violent. This engineer considers from six to ten streams, of varying character in so far as the timber growth is concerned, so that the results of his investigations are conclusive. If this condition is found to exist in California there should be no doubt as to the effect of forests on stream flow in Wyoming, where every acre-foot of water has a value and where the anuual precipitation is less. Forests do delay the melting of snow for a week or two in the spring. They shade the ground as the melting begins, and the water is at first absorbed by the blanket of snow beneath the branches of the trees. The snow finally becomes saturated with water and in this condition it all melts and runs away in a very short period. Regardless of the initial delay in the melting of the snow on the forested area, the total volume of water contained therein reaches the larger streams at a time equally as early as does the water from snows on the exposed areas. The delay which occurs is of a cumulative kind. The floods occur long before water is needed for irrigation and the theory that forests store water is as valueless to the irrigator as is the attraction of the sun and moon.

The conservation idea has been very contagious. If the national Government, after this spasm of enthusiasm and bureaucratic advertising, is able to point out how we are to use our coal and lumber and still have it, we will be under obligations. If we can be told how a tax on our most important industries will ever help development, we will be thankful. If we can be shown where, in a single instance, the national Government has ever even encouraged a careful use of natural resources we will appreciate it.

The earth has supported man for a number of years in the past. Those regions where our primitive ancestors first lived are still productive. Eygpt contains more wealth today than it did four or six thousand years ago. It has never enjoyed the benefits of a forest service; it has never felt the necessity for conserving everything. Our country presents a greater variety of natural resources than any equal area on the face of the globe. The people of the West have tried to make use of these. They have already obtained title to some of the area embracing these resources and, as far as we know, they have benefited themselves and humanity by so doing. They have not until recently paid any direct tax to great bureaus at Washington—but this is neither an indication of any weakness of the Government, nor is it a criterion by which we may judge as to the effect of the original policy of the Government on succeeding generations.

In discussing this great question of conservation; this new idea that the Chief of the Forest Service has brought out, we must not forget that he is responsible for many of the rules and regulations that retard and discourage development. He, more than any other man, has had opportunity to study methods whereby he might obtain control of large areas here in the West, which are conserved and preserved for the benefit of himself, his friends and posterity—posterity, that elusive thing of the future which has, like tomorrow, never been attained and which, if ever reached, will be found taking care of itself. This Chief has no family, hence has had no experience in home building and has no personal interest in posterity. His activity in everything that tends to make life a long and pleasant dream for our descendants is, therefore, not promoted by any selfish motive. He ir a public spirited man. He has some

ambition. His Forest Service was organized when the advertising department was created. He has had considerable time to study other duties which might be performed in the interest of posterity. In all of this, however, he has not forgotten the party of the first part and his present aims and purposes. He would rather deal with problems of the present which relate to his own aggrandizement, than to determine by observation or experience whether it is best to cut southern pine with a butter knife or a hack saw. He is a deep student. When not engaged in writing articles dealing with the prospects of a meeting of the conservation commission, or describing in plain but elegant English the political support that he is obtaining, he is in a brown study devising some relief for posterity. The results of his mental labors are becoming apparent. It would seem that any policy or regulation which will make life a burden to the people of the West, he gladly accepts as a boon to future humanity. The difficulties which confront the homemaker without means seem to be of but little consequence to him. It is the descendants of these settlers that must be protected. If necessary, starve the new comer, who must face all of the obstacles that a rugged nature presents, if, by so doing, those who are to build a wood shed five hundred years hence may get timber at their door rather than to convey it for a mile or two. Anything that can be preserved and kept in its wild and natural state immediately rouses his interest. If the entire West could be fenced and placed under his control, ideal conditions, according to his judgment, would be attained. Never in the history of the world has one man held sway over an area comparing with the expanse of the present forest reserves. Such things were, doubtless, among the dreams of Alexander the Great and Cæsar, but neither dared to whisper any policy which would realize them in practice. Fate has decreed, seemingly to spite what should be regarded as a natural sequence of events, that such a condition should first present itself in a republic—the first and greatest nation, where laws are made by and for the people.

History can cite no greater misuse of executive authority than when portions of states were moved from the sovereignty of those states and placed under the control of a national and absent landlord. History evidences no greater tribute to advertising than is witnessed in the creation and growth of the Forest Service. This advertising has been so successful that he who raises his voice in protest must do so with some feeling of misgiving. Our ideas and the principles we support are discredited because we have been advertised in the East as land-grabbers and thieves. Those who may have already profited by fraudulent practice in securing lands in the West are now profiting further by the reputation placed **on all land laws.** The people of the public land and states are now cursed with such a reputation as these few law breakers alone should merit. This is one of the results of bureaucratic advertising.

We have discussed our troubles and endeavored to point out some of the causes. If there is a remedy, we should seek it and take immediate steps to put it into practice. We must agree on one point. No department of the Government or the state should go into the business of advertising. This is true, because it is not necessary to advertise good government or good governmental policies. The bad ones cannot endure, but they can be maintained for a time by cunning advertising. The publicity department of the Forest Service may be likened unto the hair of Samson. We should unite in an effort to make plain to the East, as it is to the West, the iniquity of the advertising system of this Department. We should then take an inventory of our ability as a people of a commonwealth that fifteen years ago had a future. We should satisfy ourselves that we have a great responsibility in this conservation movement. We should realize that we can trust ourselves rather than be compelled to comply with the whims and childish theories of some pleasant gentlemen who seem to think that they are endowed with a divine right to rule, and to restrict settlement, for the benefit of wild animals and trees. The people of the West have the capacity, the honesty and the ability to administer those resources which were, we had presumed, been dedicated to our use by Congress. Our progress as a state must depend upon our uniting every element in a demonstration which will convince the nation at large that we are able to deal with all problems relating to the control and development of natural resources and to show that proper use rather than conservation is essential.

BLUEWATER VALLEY
NEW MEXICO

BY OLANDER.

The probability of the Territory of New Mexico becoming a state has already had its effect. All over the territory people are looking for an immediate increase in business and increased values. Those who have gotten in feel that they are very fortunate.

The Bluewater Development Company contemplates raising its dam to a height which will enable it to provide water for considerable additional acreage, which should cause a decided movement in the valley. It is rapidly approaching its limit on the present construction and there is little doubt that this season will see the lands pretty well taken up.

The results in crops and prices obtained therefor last season have stimulated those who are here to increase their acreage. The location of the lands right on the railroad, the high prices obtained for all products of the soil, 90 cents per bushel for oats and $16 per ton for alfalfa, the free range surrounding the valley, the fact that New Mexico imports 85 per cent of what it eats, all assure great success for the settler.

Perhaps one writing from here gets or appears to get, overenthusiastic, but he at least feels that he has a good deal of justification in the fact that no one who has seen the valley has failed to fall in love with it, with the possible exception of one man, and he had walked several hundred miles.

Work is progressing rapidly and it looks as though any one who wants to get some of the land close to town, and which has already been under cultivation, had better get it quickly.

(All inquiries may be addressed to the editor of this paper.)

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

The Art of Irrigation

Chapter Ten

By T. S. Van Dyke

Before these small streams were used, large streams in deeper furrows were in use and are probably as old as irrigation. But they were not intended to wet the whole ground except in a very few cases. There are some soils in which water can be made to rise by a long run of water in ditches so that roots from the surface can reach it. Sometimes it can be brought so near the surface that a great variety of garden stuff can be raised by it with no water ever applied to the top. A common sight in river bottoms in California is immense corn growing on rich alluvium with the water table several feet below the surface and held there by the water flowing above ground all summer, or by the flow beneath the sand, which is common to all the rivers that run dry. Potatoes, pumpkins, melons, celery, beans, peas and many things besides corn often grow with the water only two feet below the surface. Many trees, like the orange and lemon, will not endure this, but others, like the pear, do well enough provided the water is moving and is not stagnant. I have seen luscious grapes grow on the same ground but they would not do to ship, or for wine, and probably would make a poor raisin if they did not sour in drying. Alfalfa will often grow on such ground, but not well and will not make the huge crops it will on well drained upland where its roots cannot touch water but plenty is applied on the surface.

On such ground nothing is necessary but to start the seed and if it is not too hot or the air not too dry, quick seeds can most always be started by the moisture which cultivation will draw up from below, though there are some soils of such even texture that no amount of cultivation will do this. The seed, once started, no water is needed on the surface.

But where lands are moist from supply from a natural stream the water is generally moving. If you attempt to imitate this with a ditch on upland, where there may be no sand or gravel beds to carry off water enough to prevent stagnation, the result may be quite different. Especially if there is much iron or alkali in the soil. Iron in stagnant water is apt to injure anything whose roots get into it. Many trees endure it and look well enough but the quality of the fruit is low and often under market size. In other things like blackberries the size of the plant may be the only thing affected, while the fruit is still fairly abundant and good enough for home use. In trying to moisten land by raising this water sheet below, you never can tell what the outlet is for surplus water and, consequently, when this stagnation will happen. In lands along a natural stream this point is well established and if you find no stagnant water there at the outset you are likely to have none in the future. Hence you had better not attempt this kind of subirrigation even on a small scale. I have seen it tried several times where the land lay on a heavy slope upon rock of the same slope, from which the top soil was formed. Parties had small streams insufficient for surface irrigation, with no places to make natural reservoirs and where artificial ones would be too expensive. They attempt to slide water down the rock face below the soil by a ditch running all the time along the upper edge. The sliding part was successful enough and the land well moistened. but with the exception of a few vegetables it was not a success, although the soil was two feet and a half deep and rich and loose, with vegetable mould, the whole having been covered for ages with a dense growth of heavy brush. No water could be found running out of the lever edge of the slope and it seemed a plain case of stagnation. Trees were runty with sour fruit, alfalfa yielding about one-fourth of a crop, etc. While the principle is bad for most things, there still may be many things that could be raised to advantage on such soil where one can do no better, though you had better confine your efforts to stuff for home use.

The use of large furrows or very small ditches has nearly always been to wet the soil in the immediate vicinity of the trees or plant without any regard to its condition a few feet away. This is common today in heavy market gardening by the Chinese, Italians and others. Corn, potatoes cabbage and many other vegetables are grown on the ridge between two furows made with a small plow or a shovel plow, throwing earth both ways. Down these a stream of about a quarter of a second foot is run. This generally runs fast and muddy but the volume is so great that it soon wets the ridge well to the top. The waste is collected in a ditch below and passed on to another tract. As soon as it is dried down to the right point the plow, generally a shovel plow, is run again in the furrow, breaking up the baking earth and throwing some fine material to the top of the ridge. It is then left in that condition until the next irrigation.

This method works quite well, the main objection being that on ground thoroughly graded, pulverized furrows one-quarter of the depth and carrying one-twentieth of the water long enough to wet the whole ground, as in fine orchard work, will, in most cases, produce better stuff and more of it without irrigating one-half as often. Mud puddles and baked ground will not be seen and the cultivation will be much deeper and finer with its effects more lasting. But unless one owns the land, the grading and the regulators at the head of the streams may cost too much. These large streams can generally be handled without regulators because the irrigator is on hand during the whole run and if some do carry too much it is of little moment because there is still enough left to go through. Much rougher ground can be handled in this way because the furrows are so deep that the water cannot escape sideways, as it easily can from small furrows, and where one can get only a short lease on land, like most of the Chinese it may be the best thing to do, though a poor model for anything but economy.

Another use of large furows, generally by the owner of the land himself, is much less excusable. Planting trees, vines and vegetables along the flat shores of a little brook or on the low banks above is a trick almost as old as the human race. The modern man improves on this in many places by making an artificial brook more or less straight. In this he sometimes keeps water running all the time. A little corn, potatoes, beans and other stuff may be raised in this way if the water is not too cold. But fruit is quite sure to be insipid or sour, with no keeping qualities. To avoid this he ran water in it only once in a while, keeping it dry most of

the time, but always using the same old channel without breaking it up each time by cultivation. This was an improvement in some ways and fair fruit was grown on some soils, but on many others the tree made slow growth, while the fruit was mostly small and tough, though better, on the whole, than where the water was running all the time. This is often from lack of drainago, though there is something more the matter. Good drainage alone will not always offset the bad effects of the reliance on sufficient water which afflicts most novices in irrigation in the dry countries. I have had old settlers on the desert tell me that the only way to raise anything was to sit up nights and pour water on it. They were very much astonished to see me raise immense crops of the finest melons with watering only an hour or two once in two weeks, right under a blazing and incessant sun, with air dry enough to dry clothes in two hours at any time of night. Every one thinks the only thing is to get on water enough and keep it there a long time. The worst fruit I ever saw was on a gravelly bar so well drained that two second feet running for days at a time on five acres left no standing water. This was about equal to ten rain inches a day. The owner turned it out on the orchard when done irrigating alfalfa and left it running until ready to use it again elsewhere. He had been doing so for many years, yet seemed to think it was all right because water did not stand in ponds in the orchard and the weather was so hot it must need it all. The five acres were planted with all kinds of trees and the fruit was in every respect the sourest, flattest stuff I ever saw, in spite of the drainage being so perfect.

When cultivation came in vogue the owner of this large furrow, finding that leaving it dry for days at a time did not fully remedy the trouble, began to break up and cultivate the dry ground beyond. This helped some by retaining moisture and making it more even about the trees, because it was not so readily sapped from the dry ground as when the surface was uncultivated. One who has never tried it by digging down to examine has no conception of the rapidity with which a piece of dry ground will sap the moisture from a piece of wet ground beside it. It is still worse when the dry ground is uncultivated and even more so when it is filled with those weeds of a dry country that will live almost dormant when the ground becomes perfectly dry, yet revive and absorb water at a furious rate when the ground becomes a little moist. Perhaps you can do nothing more valuable at the beginning of your experience than to try this very thing so as to get a practical idea of the importance of wetting the whole ground and retaining the moisture by cultivation until the roots of your crop take it out. In no other way can it be kept even in the soil and if not uniform, but subject to change of quantity or location, there will be more or less fluctuation in the growth of the plants. And all such fluctuation means some loss, for everything should be kept growing at its best.

But in spite of this cultivation, the results were not yet what they should be, as the irrigator soon learned by visiting some of the districts where the small furrow system was worked to its highest capacity. He learned that if he did not break up the ditch each time by cultivation, that it gradually became cemented or puddled more and more at each irrigation. For the large streams running fast carried mud and silt instead of running clear as in case of the small furrows. Thus they began at once to puddle the sides and bottom of the furrow and reduce the soaking capacity of the soil. When dry they were a channel of fine, dry mud filled with many cracks. The muddy water run in the next time filled these cracks and made the whole still tighter. The consequence often was a tree standing close to plenty of water, showing no suffering, perhaps, to a common eye, yet doing far from its best work, because there was not enough of the ground wet with the proper uniformity to give it the utmost feeding ground that a tree of its age should use. This method has now been generally abandoned by all irrigators who take the slightest pains to learn what other people have discovered. But the man who goes through the world with his nose in his own plow furrow is apt to fall into the old error. There are places where, owing to the lay of the ground and the impossibility of getting a sufficient irrigating head, one can do nothing better. But if so, he should not attempt to raise fruit for market except in some special locality like a mining region where any kind of stuff commands a good price.

This large furrow system must not be confounded with the small furrow system, as often exhibited in pictures of irrigation. In most all of these it is simply small furows with too much water cutting and tearing and overflowing in places, making one think the whole ranch would be carried to the sea in a few years. Sometimes this is done because the soil is so porous that small streams would not get through. But it is better to cut the tract in two and feed over again from another ditch or lay out the whole tract in more places, each with its own distribution. The distinction is that in the small furrow system the whole ground is wet, whether properly or economically makes no difference. In the large furrow system only a part of it, often less than one-fifth of it, is wet. Where it wets from soaking upward from raising of a water sheet below is quite another system. Each one is bad and should never be used where conditions do not compel it.

MAKES FARMING EASY.

We are showing in this issue one of the engines manufactured by the Hart-Parr Company of Charles City, Iowa, which is used by Mr. W. L. Faulkner, of Bozeman, Mont. This outfit does discing and seeding at the rate of 40 acres per day.

There is an interesting story told us by one of the firm in connection with this outfit. Early in the spring of 1907, Mr. Faulkner had the misfortune to have his horses badly infected with glanders, and the state veterinarian killed ten of them, leaving him only two, they being the poorest in the lot. He was afraid to buy any more horses for fear they might become infected also. He was farming two sections of land and had 700 acres of summer fallowing to do. He had been considering the purchase of an engine of this character and his misfortune with the horses necessitated buying an outfit at once as he had to do something quickly in order to get his summer fallowing completed so that he would have crops the following year. Soon after the purchase of this engine, early in May, 1907, he went over his 700 acres with it and in September he put four of the largest sized disc harrows behind it and disced his ground. In October he attached two double discs and three drills to the engine, double discing and seeding a strip 20 feet wide at one operation, covering

from 35 to 40 acres per day. He had a small separator of his own, and did his own threshing, and with his Hart-Parr tractor hauled his entire crop to the elevator, a distance of six miles, hauling as high as 600 bushels of wheat in one load. The success of this tractor was so great that Mr. Faulkner has carried on his two section farm ever since with the aid of this outfit and the remaining two horses. He says he makes more money and has less worry than ever before in his life, and that his ground is worked much more satisfactorily.

Those who are similarly situated would do well to correspond with the Hart-Parr company with a view to getting additional information as to the possibilities of work with this outfit.

Owned by W. L. Faulkner, Bozeman, Mont.

UNDERGROUND IRRIGATION TO RECLAIM ARID LANDS.

The National Land and Sub-Irrigation Company, with $3,000,000 capital stock, has just been organized under the laws of Arizona. It is proposed to install several demonstration stations in New Mexico, Arizona and Colorado, and in general develop the new system of irrigation by means of ordinary drilled wells. The promoters declare that from ten to twenty-five acres can be successfully irrigated from a well that will supply fifty to one hundred barrels in twenty-four hours. They maintain that water in sufficient quantity can be found almost anywhere in the arid and semi-arid belt at from fifty to three hundred feet depths, and that sub-irrigation will revolutionize the dam and ditch system now in use.

The new organization acquired the patents recently issued to Prof. John L. Wiggins of Kansas City. His new tile-making machine, which makes and lays a continuous cement tile, is said to be one of the greatest inventions of the age, and will make from 30,000 to 40,000 feet of tile per day. It mixes the sand and cement, digs the ditch and moves itself along automatically. It is with this machine that the arid west will be made to "bloom like the rose."

Details could not be learned, but it is understood that several hundred farmers will be secured who want lands in the dry belt of New Mexico, and the company will assist them in placing the Wiggins system in operation. The homeseeker will have several years in which to pay for the irrigation plant. Professor Wiggins, the inventor, stated today that an effort would be made at once to install several sub-irrigation stations in New Mexico, and that during the coming year his new system would be in general use in the fertile valleys and rich mesa lands in the west. He said the Carey act made it possible for thousands of actual settlers to take up homes in the southwest, and by his invention tiling could be made and laid at nominal cost per acre. Heretofore it has cost from five to seven cents per foot to make tile, but by this new process it can be made at from one to three cents per lineal foot.

WENATCHEE, WASHINGTON.

Ten thousand acres of land will be placed under irrigation in the Wenatchee valley, west of Spokane, within the next two years by the extension of the present canals. The Wenatchee Canal Company has completed a power plant on the Wenatchee river, generating 5,000 horse power, which will be distributed along the present line of the canal to be used for pumping on lands above the present level of the canal. This will be supplemented with power from the Entiat Power Company and the Wenatchee Electric Company to irrigate large tracts above the high level or a gravity system.

This scheme will be carried on by these companies working independently, and will mean the expenditure of $500,000 in putting in power plants and distributing systems. There are now 35,000 acres of land in the Wenatchee valley in a high state of cultivation, which but six years ago were practically arid owing to the lack of water. Since irrigation started there 15,000 acres have been developed into one of the greatest fruit districts in the world. The entire valley is now a city of 10-acre tracts.

The new canals will irrigate the higher benches along the Wenatchee and Columbia rivers within a radius of 10 miles of Wenatchee, making the city of Wenatchee the center of 25,000 acres of orchard which, it is estimated by experts, will produce 25,000 carloads or approximately $17,500,000 annually.

Walter M. Olive of Spokane, who is working with W. T.

Clark, president of the Wenatchee Canal Company, in developing this project, says:

"The Wenatchee Canal Company began the construction of its large irrigation system in 1902, spending $225,000 for the original canal. In 1906 the canal was enlarged to carry sufficient water for irrigating 6,000 additional acres across the Columbia river. In order to accomplish this it was necessary to build a great highway bridge at Wenatchee, costing $200,000. On this bridge there are two large pipes extending from the canal on the west side to the extension east of Wenatchee. This land is now all planted to fruit.

"This increase in the irrigation systems around Wenatchee will mean much to the community. Six years ago the land was not watered, the result from irrigation has been to make the town and country prosperous. The additional irrigation project will only open more land and while it may cost more than the present gravity systems the results in the past have shown that no expense in securing water can be too great, as the returns from the land are so great that any cost for water within reason is soon overcome."

NATIONAL IRRIGATION CONGRESS.

"Governor Davidson will appoint a delegation from Wisconsin to attend the seventeenth National Irrigation Congress at Spokane, August 9 to 14, and he trusts that the state may be well represented. If it is possible for the governor to attend, he will gladly do so."

O. G. Munson, private secretary at Madison, conveys the foregoing information in a letter to R. Insinger, chairman of the local board of control, adding:

"I assure you that Governor Davidson fully appreciates the importance of the irrigation congress, and is willing to do all he can to promote its success."

Mr. Insinger has also received advices from governors in middle-western, eastern and southern states, intimating that they will participate in the exercises at Governors' Day during the Congress. George E. Barstow of Barstow, Texas, president of the organization, will preside, and among the speakers will be James J. Hill, chairman of the board of directors of the Great Northern Railway company; Howard Elliott, president of the Northern Pacific Railway company; United States Senator Cummins of Iowa, and Charles S. Osborne, regent of the University of Michigan.

It is also likely that President Taft and several members of his cabinet will be here one or more days. Among the other speakers will be government representatives, railroad presidents and experts in their lines to discuss forestry, reservoir, dams, reclamation of swamp and arid lands, good roads, homebuilding, education and other problems in which the entire country is interested. There will be a demonstration of the scientific application of water, also an industrial parade, a march in review by the Irrigation Army, and the singing of the Irrigation Ode by a chorus of 1,000.

Tennessee will be represented by a strong delegation at the Seventeenth National Irrigation Congress in Spokane August 9 to 14, when forestry, deep waterway, good roads, reservoir, reclamation of arid and swamp lands, homebuilding and other problems will be discussed by experts in their various lines. It is expected there will be from 4,000 to 5,000 delegates and visitors from various parts of the United States and Canada, Europe, the latin republics and the Orient. George E. Barstow of Barstow, Texas, president of the congress, will preside.

Hon. Malcom R. Patterson, governor of Tennessee, writes from Nashville in a letter to R. Insinger, chairman of the local board of control, that he will appoint delegates to the Congress, adding: "In regard to my attendance, I could not give you a definite answer this far in advance." However, Mr. Insinger, who invited Governor Patterson to participate in the exercises at Governors' Day, believes that the chief executive of Tennessee will attend.

"We already have favorable replies from several governors in the Southland," Mr. Insinger said, "and, since the people of Tennessee are vitally interested in many of the questions to be discussed by this Congress, I have every reason to believe that Governor Patterson will not only appoint a representative delegation but will also honor the City of Spokane and the Pacific Northwest by his presence.

GARDEN CITY KANSAS and VICINITY

By R. H. Faxon.

The impression erroneously prevails, and with it some detriment to western Kansas, that this section is a treeless plain.

This is doubtless due to the fact that the western portion of Kansas was once a part of the Great American Desert. and is always referred to in the government reports as in the Great Plains Area.

Afforestation has gained great headway in Kansas, and in no other place is this fact more pronounced than surrounding Garden City. The name of the town is not an exaggeration, it is a fact—it is a Garden City, and how and why it is so may be of some interest and certainly is to the credit of not only the present-day generation but the previous generation of pioneers, who made this section what it is today.

I was examining some old reports recently and came across something that seemed to me like inspiration. It foretold the glory and achievement of the Garden City region, and it was little short of prophetic wisdom and great discernment. It is contained in a report made by the Commissioner of the United States General Land Office, one Joseph S. Wilson, in the year 1868. A passage of it that is worth the while to note follows:

"The production of a thriving forest at some point west of the one hundredth meridian, as it would establish the fact of its practicability, would, without doubt, contribute greatly to the value of that part of our domain. Whether an enterprise of the kind, under the auspices of the government, would be likely to realize the expectations of its projectors, would depend very much upon the character of the persons who might be charged with the duties and responsibilities of the undertaking.

"It is scarcely to be doubted that the artesian well system might be rendered a great success on the plains. All the conditions appear favorable. The rainfall in the vicinity of the mountains is as great as in many portions of Central Europe; and the melting snows on the highest crests feed the streams flowing from the sides of the mountains until late in the summer.

"The quantity of water thus flowing towards the plains is thus very great, but much of the greatest quantity sinks in the sand within fifty or sixty miles of the foot of the mauntains, and as the strata dip eastward, the water follows the same course, descending until it reaches the impenetrable bed, and it seems very reasonable to suppose that there are reservoirs at various points beneath the surface of the plains that could be utilized by such wells.

"Even the water that falls on the plains themselves, not by any means inconsiderable, soon sinks into the parched and sandy soil in much larger quantities than those carried off by drainage or evaporation.

"If this matter were thoroughly tested and the fact established, the confidence it would inspire as to the reclaimability of the least inviting portion of the plains would be very great, and would result in the rapid settlement and improvement of that part of our national territory."

The above prophetic and significant words were written by a government officer more than forty years ago. He suggested a course then that persistently attracted itself to the pioneers. They held crude and vague ideas, many of them impractical; but when the period of buffalo-baiting and Indian-depredation was over, and after the first of the grazing cycles was ended, the mind of man in this western Kansas section turned to more permanent things. Then he began to reason it all out; and while I doubt whether the musty old tome I found in a library here and whose passage I have just written, was ever seen by any of these western Kansas pioneers, I know it to be a fact that a generation ago many of them clung with pertinacity to these selfsame ideas. Sooner or later they were going to test it all out. Many of them did not live to see the

fruits of their vision, but some of them did. and to them and their children and the more advanced and intelligent followers came the problem worked out and ready for inspection of him who might go to see.

The Garden City region of today, with its vast forest reserve, over which there is rapidly creeping the tree-planting of the government; the splendid government reclamation project pouring out its column of smoke to the sky and its volume of water to the thirsty acres; the dry-farming experimental station that is teaching men how to farm intelligently and scientifically; the half-dozen private irrigation canals; the vast sugar factory, into whose hungry maw go annually thousands of tons of beets; the alfalfa that sells at top notch, and whose seed is the marvel of this country; the fruit and the vegetables, the fat cattle and hogs, the fine horses, the growth of intensified farming—all these in the year 1909 in the Garden City vicinity bespeak the realization of the dream of the Commissioner of the General Land Office of 1868, and the visions of the hardy pioneer—all these dreams and visions and yet more.

"The production of a thriving forest at some point west of the one hundredth meridian . . . would contribute to the value of that part of the domain," said Commissioner Wilson in 1868.

In the year 1905 the president of the United States, at the extreme solicitation of United States Senator Chester I. Long of Kansas, who had personally visited this region many times, and had been interested by one of the energetic citizens of Garden City, Mr. F. H. Evans. issued a proclamation setting aside some 97,000 acres of the public domain for a forest reserve.

The region embraced that portion of the Garden City vicinity lying south of the Arkansas river, beginning at a point just east of Garden City, and extending westwardly across Finney county and a portion of Kearny, following the winding of the river. This region was largely sand dunes. The shifting winds had piled the sand in little hills and had swept out little valleys. In more recent years had come the grasses, overgrowing the sand and making a pasture for cattlemen. There was very little agricultural land in the proposed reserve. For any other purpose than afforestation, the land was practically worthless.

In the year 1908, by still further investigation, the western boundary of this reserve was extended to the Colorado state line, still taking in the territory just south of the Arkansas river, and now embracing an acreage of some 225,000 acres. The name of the forest reserve was changed from the Garden City forest reserve to the Kansas national forest.

In due time the Kansas national forest was made what the Forest Service calls a "unit," and headquarters, with an acting supervisor, was established at Garden City. Later, when it was found that the transfer of young nursery stock from Halsey, Neb., was not only expensive but entirely unsatisfactory, a nursery was established at Garden City and thereafter the young trees planted by the tens of thousands were grown there. That is the situation today.

In the first season of the history of the Kansas national forest, a full section of this sandy land was planted to trees, mostly young pines of the Western yellow variety. This was a modest beginning—less than 1,000 acres out of a total of 225,000. But it was a beginning, and it made a nucleus that led to greater and ampler results. The planting has continued during all the good weather since, and the most extensive plans are being made for the coming season.

The young trees have grown and thrived, and while the development of the Western yellow pine is exceedingly slow, the situation is encouraging to both the government representatives and the local pride.

Revenues are also derived from the grazing permits. as in all national forests, and ten percentum of the yearly income goes to the state and into the school and road funds.

While the pine is the favorite variety for planting, others are put out, including locust and Russian mulberry.

The situation in Kansas, a prairie state, is of course much different as to the relation to that portion of the government known as the Forest Service, than in well-forested states, where abuses have crept in, and there has been much criticism of the encroachment on the settler and the home-maker. It must be remembered that while Kansas is a state not by any means lacking in its clumps and groves of trees, its well-shaded farm houses, and its wood lots and small plantations for the trade, it is not a forested state by any means. Hence there is not the criticism and objection to the government's forest policy, be that criticism and objection real or fancied, as the case may be, as in states like Colorado, Idaho, Wyoming and other portions of the west. Kansas wants trees, and is glad of any aid and assistance that may be rendered, be it government, state or private.

And there is that aid, not only on the part of the government, but by state and private enterprise. There is this much that may be said, then: That the local work done years ago in a small and disconnected way, that has made the Garden City region far from being a treeless waste, and the later work by the government at Garden City on the Kansas national forest, has acted as an incentive to the entire state. In other words, Garden City has paved the way, set the pace, furnished the incentive, and there is an awakening towards forestry all over the state.

Having a modest but efficient forestry law, and an administration that has not been efficient or effective, Kansas set about this year to remedy these evils, and as this is being written the state legislature at Topeka bids fair to put into effect a forestry law that may not be entirely satisfactory to those conducting the campaign, but will be an improvement on the present condition.

Hence the observation by the Commissioner of the General Land Office in 1868 that "whether an enterprise of the kind, under the auspices of the government, would be likely to realize the expectations of its projectors, would depend very largely upon the character of the persons who might be charged with the duties and responsibilities of the undertaking," has created a situation that would lead to no doubt on the part of the speculative mind of the man who uttered it if he could see the work today in western Kansas, due to the initiative of Garden City and vicinity.

Private enterprise has also accomplished much. There is scarcely a farm house in the Garden City region that is not sheltered and protected by its little grove of fine trees. Where once the buffalo and the Indian trod—not so long ago in the memory of man—are now the comfortable houses of the progressive farmer, his sightly outbuildings, his grove of trees. The latter are planted for various purposes. Some plant for mere shade, others for effect on climatic condition, others for wind-break, others for use, and all are satisfied with the result.

In the city of Garden itself are trees so thickly planted, so overlapping in sweep of limb and bough, that a veritable arbor is created. There is no need of observation of Arbor Day in Garden City, unless it be to replace the frequent poplar and the rapidly-thinning cottonwood with the more substantial and modern variety of ash, mulberry and maple. No barren desert in respect of trees is the city of Garden.

And along the irrigation canal, up and down the beautiful valley and the gently-sloping upland, where grows the luxuriant alfalfa, the sugar beet for the nearby factory, the fruit and vegetables for the hungry towns, are trees, trees, trees. It is a beautiful sight in June, and still more beautiful and grateful in August. The once barren valley is a garden. Fields are fringed with trees, and happiness and prosperity reign in the Valley of Contentment, which is another name for the vicinity of Garden.

Now go back and re-read what the Commissioner of the General Land Office said in the year of our Lord 1868 concerning the buried waters, down in the sand and the strata underneath the ground. Think of his prophetic mind, and think of the chain of pioneers, puzzled but confident, of government experts who wandered over this region from its settlement up to the near years of the recent past, and of the concentration of thought and cohesion of purpose that awaited only the passage of the reclamation act of June, 1902. Then see what has happened at Garden City since then. In preceding pages of Irrigation Age, and in other numbers, I have described fully and simply the work the government has put in the hands of the Finney County Waterusers' Association, and the spread of the water over ten thousand fertile acres in this vicinity.

Supreme Court Decisions

Irrigation Cases

PRIORITIES.—

Since a priority may be measured both by volume and time, the number of acres of land lying under the ditch which it is proposed to irrigate is material, at least as to the element of time.—*Bates* v. *Hall.* Supreme Court of Colorado. 98 Pacific 3.

DURATION OF APPROPRIATION.—

An appropriation of water is limited, in quantity as well as in time, to the extent of the appropriation, and, where water was taken from a ditch for mining only through the winter months up to June 1st, the right of appropriation was limited to that period.—*Davis* v. *Chamberlain.* Supreme Court of Oregon. 98 Pacific 154.

APPROPRIATIONS.—

Where a water storage company made an appropriation from a river of a given volume, which was junior to that of a reservoir company for its particular reservoir, it was senior as to all the waters of the river as against all subsequent appropriators who diverted water from the river for storage purposes.—*Windsor Reservoir & Canal Co.* v. *Lake Supply Ditch Co.* Supreme Court of Colorado. 98 Pacific 729.

NEGLIGENT LEAKAGE FROM IRRIGATION DITCH.—

If defendant negligently permitted water from its irrigation ditch to escape onto the plaintiff's land, because of defects in the ditch, or allowed the flow of the water to be obstructed so as to cause it to seep through the ditch and injure the land, defendant would be liable; the injury not being damnum absque injuria.—*Paolini* v. *Fresno Canal & Irrigation Co.* California Court of Appeals. 97 Pacific 1130.

UNRECORDED DITCH DEED VOID.—

Where S. took a conveyance of real property and paid a valuable consideration therefor, and had no notice of an outstanding unrecorded deed for a ditch and right of way through the property, and recorded her deed of conveyance prior to the recording of the outstanding deed for ditch and right of way, under section 3001, Rev. St. 1887, the unrecorded deed is void as against such subsequent purchase.—*Swank* v. *Sweetwater Irrigation & Power Co.* Supreme Court of Idaho. 98 Pacific 297.

DAMAGES FROM INSUFFICIENT SUPPLY.—

The evidence showing that defendants planted their land to rice; that it came up to a good stand; that all except 35 acres of it died because of failure to receive water at the proper time; that the land, if properly watered, would have made from 15 to 20 sacks of rice per acre; and that the loss, without fault on defendants' part, was caused by plaintiff's breach of its contract to furnish the water necessary for cultivation of the crop—they are entitled to recover all damages sustained.—*Sisk* v. *Gravity Canal Co.* Court of Civil Appeals of Texas. 113 Southwestern 195.

WATER RIGHTS—TRESPASS.—

Rev. St. U. S., Sections 2339, 2340 (U. S. Comp. St. 1901, p. 1437), and Rev. Codes Mont., Section 4840 et seq., creating and regulating water rights for irrigation, etc., while recognizing the right of an individual to acquire the use of water by appropriation, neither authorizes nor could authorize, one person to go on the private property of another to make an appropriation except by condemnation proceedings; the general government having merely authorized the prospective appropriator to go on the public domain for that purpose.—*Prentice* v. *McKay.* Supreme Court of Montana. 98 Pacific 1081.

Cement Aqueduct Across Pecos River, Carrying Water for Irrigation near Carlsbad, New Mexico.

IRRIGATION DISTRICTS.—

Under act March 7, 1887, p. 35, c. 34, section 13, as amended by St. 1897, p. 263, c. 189, declaring that the legal title to all property acquired under the act providing for the organization of irrigation districts shall vest in the district, and shall be held by it in trust for, and shall be dedicated and set apart to the uses set forth in the act, the legal title to all the lands of an irrigation district organized under the act is held in trust by the district, and the beneficial title is in the owners of the land within the district, and land which by reason of a change in the plans has become valueless for irrigation purposes is impressed with a trust, and is, like the other land of the district, exempt from execution.—*Tulare Irrigation District* v. *Collins, Sheriff.* Supreme Court of California. 97 Pacific 1124.

CONSTRUCTIVE TRUST IN IRRIGATION PROJECT.—

Decedent posted notices of appropriation of water, intending to acquire a partly completed irrigation canal, and

use it in distributing the water appropriated. Being without sufficient means, he interested defendants; it being agreed that a corporation should be formed to carry on the enterprise. Decedent conveyed all his rights to defendants in trust, to be conveyed by them to the corporation on its formation. Afterward one of the defendants obtained individually a lease on the canal, and posted notices of appropriation substantially covering decedent's notices. *Held*, that decedent and defendants were partners in the enterprise until the formation of the corporation, and that defendants were trustees of the partnership, holding, as such, the rights conveyed by decedent.—*Beckwith* v. *Sheldon*. Supreme Court of California. 97 Pacific 867.

ESTABLISHED RATES.—

Act March 12, 1885 (St. 1885, p. 97, c. 115), section 6, provides that, at any time after the establishment of water rates under the law by any board of supervisors in the state, the same may be established anew or abrogated in whole or in part by such board, to take effect not less than one year after the first establishment upon the written petition of the inhabitants or of any persons, companies, or corporations, the rates of whose appropriated waters have been already established. *Held*, that an irrigation company whose rates were established by a county board of supervisors could not after the expiration of one year after the original establishment of such rates sue in equity for redress against the rates established without first resorting to the board of supervisors.—*San Joaquin & Kings River Canal & Irrigation Co.* v. *Stanislaus County*. Supreme Court of California. 99 Pacific 365.

PAYETTE, THE VALLEY OF IDAHO OF DIVERSIFIED RESOURCES.

BY J. A. HARADER.

There are many irrigated sections and valleys in the West and Northwest and many new districts are now being reclaimed and their desert wastes transformed into productiveness, wealth and homes, some at no little cost of labor and expenditure of capital. These irrigated sections of the West are, without doubt, the richest and most productive lands in the world, and are being sought by both home-seeker and investor.

The extent and diversity of the resources of these irrigated portions of the West vary, however, very widely. The idea that all irrigated lands are similar or that all irrigated sections are much the same, is a very erroneous one. There are as many and as wide differences between different irrigated countries as there are between those same irrigated countries and the farming districts of the East and the Middle West.

In the first place, that most vital thing, the water supply or source of irrigation and its cost of application and maintenance vary very widely, and those sections are indeed blessed which have an abundance of water for irrigation and more especially so when it can be applied and maintained at a moderate cost and with certainty. Water is king in the desert. Also the climatic conditions, the altitude and the temperature of these sections vary to a remarkable degree. Some irrigated sections are cursed with almost continuous winds of high velocity, which, with the dust that is common to all irrigated countries, are very unpleasant, and often of great damage to crops. Other sections are unfortunately affected with killing frosts in the spring and fall, to the great detriment of crops, especially of fruits. Still others are made undesirable for habitation by the lack of or great difficulty in procuring good water for drinking and domestic purposes, while others are unhealthful and affected with malarial and other fevers.

Perhaps the greatest difference, however, lies in the products of these different sections, due possibly to the variance of the soil formation and the climatic conditions. Most of these irrigated sections of the West are peculiarly adapted to some one or two particular products, or perhaps limited to only one or two varieties of fruit. Some are adapted to hay and grain only; some are able to produce hay and grain and perhaps winter apples; others will produce berries and apples and not hay and grain; some will produce peaches and grapes, while others will not; while still others, blessed with a combination of resources in the way of climate, soil and water, are able to produce in abundance and to perfection all of the products common to each of the other districts. These sections af diversified resources are few, however, and when found, are the chosen spots of the whole irrigated West, and may rightly be called the "Land of Homes and Contentment."

Such a country as this may be found in the state of Idaho, in the southern part, and it is known as the Payette Valley, its principal town being the town of Payette, a beautiful little city, modern in every way, located on the main line of the Oregon Short Line Railway. It has been the privilege of the writer to visit in nearly all of the irrigated valleys of the West, and he is free to confess that he has never found a valley so rounded out in resources, so wonderfully blessed by nature, as this little valley, nestled in the low foothills of the Rockies, and through whose center courses the Payette river.

This valley has an abundance of water, which may be applied and maintained at a low cost. In fact, this valley has one irrigation ditch which is said to be one of the cheapest and best ditches in the United States, the original cost per acre being but little over ten dollars, and the annual cost of maintenance per acre being not over twenty cents.

In addition to this, the valley has plenty of good water for domestic purposes and is very free from winds and frosts. Its products are the most diversified, perhaps, of any section in the West. While the Jonathan apple is its favorite product, and the one thing which it seems to grow better than can be produced anywhere else in the world; still, any kind of an apple, as well as cherries, peaches, prunes, pears, apricots, nuts, and every kind of berry grow splendidly and with profit. Alfalfa, timothy, and all other grasses; wheat, oats, barley and all kinds of grains prosper and yield largely; beets, peas, vegetables, potatoes and onions are very profitably grown. Cattle, sheep, poultry and bees likewise turn many thousands of dollars to the accounts of the prosperous husbandman of this wonderful little valley.

These possibilities in the way of agriculture, horticulture and stock raising, coupled with the healthful climate, the splendid conditions for home-building, the vast resources of mineral and forest which surround it, the beauty and pleasure lurking in the streams and lakes of the surrounding mountains, the tremendous water power still latent in the Payette river, and the transportation facilities which are fast coming to her command, all are destined to make of this little valley of the gem state the most favored spot, not only in Idaho, but in the whole great Northwest.

CONSERVATION OF MOISTURE.

BY AUGUST WOLF.

Conservation of moisture as one of the essential factors to successful horticulture is urged by W. S. Thornber, professor of horticulture in Washington State College at Pullman, south of Spokane. The growing of fruits in the semi-arid districts in the northwest, as well as in other parts of the United States and Canada, is a phase of horticulture which has received little or no attention in the past, hence it will be good news to many that by a system of careful cultivation and rigid selection of varieties and care in selection of trees and vines many fruits can be grown in the dry districts. Professor Thornber's argument follows:

It will be necessary to practice great care in the conservation of moisture to make it possible for a tree to grow and produce fruit in these sections. This is to be considered as a most important phase. We must make use of all the moisture that falls, and make use of every practice that will conserve this moisture.

A certain amount of well rotted manure added to the land will help hold the moisture much better than where no manure is used. Almost every farmer and fruit grower is familiar with the methods of tillage that conserve moisture. Deep, thorough tillage in spring and constant shallow tillage during the summer will do

more to make fruit grow in these dry sections than any other phase of cultivation.

Thus by the addition of well rotted manure, or the growing of cover crops until the ground is in good condition, and carefully conserving the moisture that falls, or can be secured, much fruit can be raised where none has been raised in the past.

Following closely upon the management and care of these fruit plantations, we must select such varieties of fruits as will mature before the very dry part of the summer comes on, or such varieties as will stand an unusual amount of drouth. This then limits the number of varieties of apples to a few winter kinds. The Rome Beauty apple and Wagner will stand more neglect and produce fair sized fruit on dry land than any other variety that we have thus far tested in our large experiment station orchard.

Varieties like the Winesap, the Yellow Newtown, the Jonathan and the Spitzenberg, while they do remarkably well where the conditions are favorable, fail almost absolutely if there is not sufficient water to supply these later maturing fruits.

Under no circumstances should they be used in the dryer sections unless plenty of water can be supplied. If a person desires an early maturing fruit, there is nothing better nor hardier than the Yellow Newtown, or some of its close relatives.

Other varieties of early maturing hardy fruit are the Duchess of Oldenberg and the Glass Green. The Red June, the Early Strawberry and a number of other apples of this class should not be planted where there is not plenty of moisture, even though they are early fruits, because they cannot stand excessive drouth.

Besides apples, there are many other varieties of fruits that will do well if given excellent care in the dry sections. In the case of peaches, nothing but the smaller fruits should be selected. One of the best early and one of the hardiest peaches we have is the Alexander, or its mate, the Amsden June. These two peaches, as tested out at the station, are very valuable for the dry situation, or if placed where the conditions are unfavorable, for general peach culture.

Another fruit that many people will be surprised at the way it grows is the Gibb apricot. While this is not large, yet it is very hardy, even much hardier than the common Russian apricot, and produces fairly large crops of medium sized good fruit, even in the dryer parts of the northwest.

Pears, as a rule, are not adapted to the dry sections, even though very good culture may be given to them. However, should one desire to have a few years, even though the fruit is not large, the Early Bartlett or the Seckel are recommended and possibly a few of the White Doyenne. At the Pullman station we have been surprised during the last year at the success that certain growers were achieving with these varieties on dry soils.

Most varieties of sweet cherries will do well where the winters are not too severe for them, if they receive a reasonable amount of moisture during the early part of the growing fruit season. It is a strange condition, but yet a natural one, that where trees ripen their fruit early in the season, as the sweet cherries do, a little or practically no moisture need be supplied after the crop is harvested until the fall or early winter rains begin.

As hardy varieties of sweet cherries, I would name the Lambert, the Vilne Sweet, and the Hoskins. The Royal Anne and Bing are not so well adapted to these severe conditions as are the first named varieties.

Almost any variety of sour cherry, and particularly the Olivet, the Early Richmond and the Wragg, will succeed remarkably well in very severe and dry conditions.

Great difficulty will be experienced in attempting to grow such small fruits as blackberries and late raspberries, particularly where these varieties mature their crop late in the summer. The difficulty will be that the fruit dries up on the bush before it gets a chance to fully mature. By carefully selecting early ripening varieties of the red raspberry this difficulty can be avoided.

The Turners Red, the Cuthbert and the Philadelphia have given very satisfactory results on the very dry soils. It will almost be useless to attempt to grow the old fashioned blackberry, but the near relative of it, the Lucretia dewberry, can be grown with a great deal of success if reasonable care is given to it.

Currants and gooseberries of the standard hardy varieties will all do well if they are cultivated and the grass and weeds kept out of them during the entire season. However, these plants will not do even fairly well if the weeds are permitted to choke them down late in the season. The early varieties of strawberries, such as Clark's Seedling, Warfield and Bederwood, will give us the best results of the strawberry group. Late maturing, late fruiting varieties should be eliminated entirely.

There are several plants that should be carefully teseted by everybody who lives in these dry sections where fruit is difficult to obtain, or it is impossible to grow it. Among these plants I will call your attention to the stubbleberry, commonly known as the Night Shade berry. This is a member of the tomato or potato family, which produces small, purple black berries in clusters, and when carefully prepared makes excellent sauce or pie material.

Another plant that is closely related to this stubbleberry is the old-fashioned ground cherry. This can be grown with the minimum amount of moisture, and makes an excellent substitute in many ways for fruits and for many of the tender fruits which it is almost impossible to grow.

Another interesting plant is known as the garden pomegranate, which is a close relative of the muskmelon, but produces fruit about the size of a medium-sized apple, and which, when cooked or prepared as sauces, is an excellent fruit plant.

These are plants that are perfectly hardy and will grow in almost any section of the country where grass or grain will grow, and should be used where it is impossible to grow the ordinary fruits.

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IRRIGATION IN FRANCE.

BY EDWARD CONNER.

Though irrigation is much appreciated in France it would be still more extensively practised were it not trammeled by so many local impediments. The legal complications to be removed before commencing to take in hand the exploitation of a water meadow are as tortuous as they are discouraging, while the difficulties are still further increased by the minute division of landed property. The laws of 1791 seem to be acted upon today, at least as regards irrigating land. For instance, the owner of the soil is only proprietor of the springs thereon. To utilize a running stream that passes through your own or your neighbor's property, or to dam it, to turn its flows to your own benefit, or even to tap the course of a canal, or of navigable or "floating" river, are important matters to be arranged at the outset, and which have frequently to be settled by resorting to the Council of State. Then the state is chary in according permission to utilize water that it has to protect for all parties and for different purposes. In the case of disagreeable neighbors, the difficulties and worries in connection with the case will be found to be numerous, while the cost of removing them will be heavy. Nor is this all, for there are also important preliminary matters to decide, such as the following: Can a constant supply of water be obtained? Is that water suitable? Are the situation and the nature of the soil satisfactory? Some water may contain highly injurious substances to plant nutrition, the soil may be naturally wet—undrained, in a word—having an impervious subsoil.

Irrigation, in the agricultural sense, implies the employment of water in order to increase the yield of crops; in another sense, it means the reclamation of desert and arid countries. It is from rivers that irrigating water is generally obtained by placing the dam across the river to secure a fall for the water over the fields. One cubic foot of water supplied every second during twenty-four hours will cover four acres of land with a fraction less than a layer six inches deep. Given suitable water and plenty of sunshine, good crops may be obtained from nearly all soils.

In France the water of the Durance river supplies many canals that largely contribute to the prosperity of Provence, while in Lombardy several canals feed irrigation, besides acting at the same time as navigable ways. Important as it is to provide the soil with water, it is equally as necessary to secure adequate means for running the water off, in order to avoid stagnation and the formation of marshes. This is why the flow ought to be intermittent, so as to pass over one surface and then over another alternately—to water the soil by "fractions" as it were. Plants, it should be well remembered, are not unlike in their demand for water. Thus, whereas *sainfoin,* or trefoil thrives well on dry soil, *lucerne* (or clover), another kind of grass needs a moist and cool soil. The same remark equally applies to deep rooted plants, which require less water than surface rooted ones.

There is both winter—autumn to spring—and summer irrigation; the water remains longer on the land in the latter than in the former operation, and which also depends on the crops to be raised. It is alleged that winter irrigation fertilizes the soil, while summer irrigation only excites vegetation. However, it is not easy to lay down any hard or fast rule as regards irrigation, considering the many contradictions to which it is subjected. It is evident that irrigation keeps the soil a few degrees warmer in winter, while it must refresh land in the summer. The great secret about the "art" of irrigation is to properly carry it out.

Sewage irrigation is a different question. Cultivators in the suburbs of Paris can command a uniform supply of city sewage all the year round. French farmers, when their holdings are small, are able to make meadows gutters or channels, following the slope of the ground, without any difficulty, and so distribute the water to their satisfaction. If the operations are extensive, a local rural engineer is engaged for the purpose of laying out the water furrows, etc., for the admission, distribution and carrying off of the surplus flooding. The plan adopted depends on the lay of the land, its area and the state of the water supply. Where several neighbors associate in the work in common, all will be found to work satisfactorily.

In mountainous districts, such as the Vosges, the peasants there have small reservoirs where the water intended for irrigation purposes is stored, and let out, as if out of a barrel, at fitting times. In less hilly districts ponds are created in which the water is stored. One *hectare* equals 2½ acres, and one *metre* is equal to about 40 inches. Now, Belgrand, the great French engineer, calculated that the quantity of water required out of the basin of the Seine for the wants of cultivators in spring and summer is 1,583 cubic metres, equal to a layer of water the 158th part of a metre, say 6 inches deep. He estimated that a clayey subsoil received 4,000 cubic metres of water by means of six waterings; but in the case of a permeable subsoil the waterings were three times more numerous, while the total consumption of water amounted to 9,600 metres per *hectare.* In the south of France a concession for irrigation is based upon, and corresponds to, a taking of a volume of water of one *libre* (1½ pint) per second for one acre, pending six months, or a total of 15,350 cubic metres. But it is only kitchen gardens that take such a quantity.

Gasparin's rules were: For land containing 20 per cent of sand, water every fifteen days, so as to give a total layer of water equal to four inches deep; irrigate every five days at the same rate if it contained 80 per cent of sand. Arrange the supply for qualities of soil between these two extremes. In the Vosges, after mowing, a shallow sheet of water is laid on the field, and the soil is allowed to dry every fifteen days, after which the operation is renewed. In winter the water is especially laid on, and particularly distributed over any bald patches of the meadows, in order to get rid of weeds and coarse grasses. As far as possible, watering is stopped on the approach of frost, when it is resumed cautionsuly in the spring and continued at intervals till ten days before hay-making. There are intermittent irrigations for the aftermath. In the Valley of the Avre, in Normandy, the meadows there are watered once a week during autumn and winter, and twice a week during spring and summer. Night is preferred to day waterings whenever the air is dry.

SUN RIVER VALLEY.

The Sun River Valley, which is located a little west of the center of the state on the eastern slope of the Rocky Mountains, and near the city of Great Falls, was selected several years ago by the Reclamation Service as a choice area for the construction of a stupendous irrigation work. The work has progressed rapidly, and on May 7, two hundred and fifty farms will be thrown open to settlers on very liberal terms.

These farms will be obtainable under the homestead law, subject to the charges of actual cost of water upon the number of acres actually supplied with water from the system. This charge has been fixed at $30 per acre, divided into not less than five nor more than ten annual payments. The sum of $3.50 will be due and payable at the time of making entry. The second instalment will be payable March 1, 1910, thus allowing early settlers nearly two years before second payment is due.

An interesting and unique feature in connection with the project is the proposed establishment of model rural villages every six miles. In all, there will be twenty of these, so that no farm will be more than three miles from a postoffice and school.

All the crops which can be grown in northern countries can be raised here. It is probable that the principal crops raised will be alfalfa, sugar beets and potatoes. Usually three cuttings of alfalfa are made annually. Some have cut only two crops and others have cut four, but the average is three, and the average yield about five tons per acre. The present price varies from $5 to $15 per ton in the stack, according to location and demand. It is not probable that the average price will drop below $5 for many years. The cost of putting the hay into the stack is about $1.25 per ton.

The average yield per acre are: Potatoes, 228 bushels; wheat, 28 bushels; ots, 69 bushels; sugar beets, 20 tons.

All garden truck is easy to raise, except tomatoes and some kinds easily affected by frosts, though these with care may be grown sufficiently for family use.

An ordinary ranch garden about two miles from Simms, in 1905, produced a net profit of $225 per acre from the following kinds of vegetables, viz: Cabbage, potatoes, tomatoes, squash, onions, pumpkins, carrots, turnips, beets and parsnips.

The sugar beets grown in the vicinity have analyzed over 23 per cent sugar. The beet industry promises great things and a sugar factory is assured upon the completion of the works necessary to irrigate an area large enough to guarantee five-year contracts on 5,000 acres of beets. Past experiments prove that the farmer should average a net profit of $40 per acre on sugar beets.

It is probable that the Sun River Valley will prove an excellent dairy country. A creamery was completed in Augusta, in January, 1907, and the three or four others already in operation in neighboring towns show that the industry is profitable and will be permanent and growing.

Full details relating to terms, size of farm units and other information regarding the method of securing lands will be furnished on application to S. B. Robbins, Engineer, U. S. Reclamation Service, Fort Shaw, Montana.

Reclamation Service News

Mr. Louis C. Hill, supervising engineer in charge of the work of the Reclamation Service in the Southwest, has been in Washington recently in consultation with the director and chief engineer, arranging plans for the work in his division during the ensuing year. He was asked concerning the contract which the Reclamation Service has made for developing the power to be utilized in the city of Phoenix. This is the contract which has been made the subject of a memorial from the territorial legislature protesting against giving the exclusive right to the Pacific Gas and Electric Company. Mr. Hill said:

"The Pacific Gas and Electric Company, by its contract with the Arizona Water Company, had exclusive right and privilege for development of all water power obtainable from or by means of canals and water owned or controlled by the water company. This contract ran until March 1, 1926. Under it two plants having an aggregate capacity of about 1,000 horse power had been built and operated. The larger plant, which used part and could use all the water belonging to lands on the south side of the river, was located some two miles below the Granite Reef dam, and if the old contract continued in force would have made it impossible for this dam to have served the south side of the river, and consequently it probably would not have been built. The operation of the old contract would have prevented building the new cross-cut with its power plant nearly opposite Tempe, where from 3,000 to 5,000 horse power, depending on the season, will be developed.

"Articles brought to my attention published recently in a Phoenix paper have conveyed a false impression to intending purchasers of power, both as to the terms of the contract and its limitations.

"The statement that the Pacific Gas and Electric Company can in any way under the terms of its contract with the United States control the sale of power to any company operating outside of the city limits of Phoenix is entirely erroneous and contrary to the express terms of the contract.

"Leaving out of account the new power plants which could be built, and considering only the two now in existence, Power Plant No. 1 and Power Plant No. 2, belonging to the Pacific Gas and Electric Company, we find that the building of the Roosevelt dam and the Granite Reef dam, or even the former alone, would have added enough to the water supply to have enabled the Electric Company to develop nearly 1,500 kilowatts *continuously*, for which they would have to pay the United States less than half a cent per kilowatt hour. This power was theirs exclusively, and could not be taken from them until 1926.

"The new contract gives them the exclusive right for retailing purposes only within the city of Phoenix of a peak load of 1,500 k. w., or the equivalent of a continuous load of about 900 kilowatts. For this power the Electric Company pays 1½ cents per k. w. hour, or three times as much as under the old contract. This contract runs but ten years from the time the United States is ready to furnish power, or until 1919, or it terminates seven years earlier than the old contract. The terms of the new contract explicitly provide for the needs of the city of Phoenix, by reserving to the United States the right to sell power to anyone in blocks of 100 k. w. and upwards, to be used for manufacturing purposes, waterworks, or pumping purposes.

Two shifts of men are now working on the Strawberry tunnel, Strawberry Valley irrigation project, Utah, and 178 feet were excavated during January. The material is medium lime rock with an occasional streak of mud. Small amounts of water also also being encountered from time to time. A total of 1,791 feet have been excavated to date, leaving 16,709 feet still to be excavated. Ninety-one inches of snow fell in the neighborhood during the month, and the freight road from Diamond Switch to the tunnel was blockaded with snow on January 20. In spite of the heavy snows and sleet, however, the power transmission line has given no trouble, and the power plant is being operated continuously. A small gang of men is being kept on the power canal to complete installing the water system and do such maintenance work as is necessary.

Approximately, 115,000 acres of land which were withdrawn from entry in connection with the Salt River Irrigation project, Arizona, have been restored to the public domain and will become subject to settlement and entry on such dates and after such notice by publication as the Secretary of the Interior may prescribe. These lands lie in townships 4 to 7 N., R. 1, 2, and 3 E., and 1 and 2 W., Gila and Salt River meridian.

Indications are that there will be an abundance of water for irrigation under the Truckee-Carson project, Nevada, during 1909. The amount of snow falling during January in the Sierra Nevadas was greater than any year on record. On the 15th of the month there was approximately 110 inches of snow at Summit Station, and at the end of the month 170 inches. The maximum amount recorded on the first of February in any previous year for which there is any record was in 1907, at which time 140 inches were recorded. There is a possibility also of heavy floods in the spring, but from recent experience with high waters it is believed the works will stand the strain.

Negotiations for the purchase of Lake Tahoe controlling works are still in progress. On February 1 the elevation of water surface of the lake was 6288, showing a rise of 1.88 feet during January. This is an extraordinary rise for the month of January. In the nine years for which there are records of the elevations of the lake the water has fallen during five and risen during four. At present the water is about 18 inches below the spillway level, and the amount of snow in the mountains is more than sufficient to fill the lake.

For this reason the owners of the outlet have been advised to let out all water possible now to avoid damage to the marginal lands when the summer rise comes.

The Secretary of the Interior has announced that the charge for operation and maintenance on the Minidoka irrigation project, Idaho, shall be 60 cents per acre for 1909, and that this rule shall remain in effect for subsequent years until further notice, the charges becoming due to December 1 each year.

Twelve new water right applications for water under the Shoshone irrigation project, Wyoming, were filed during January. Unfavorable weather and the depleted condition of the first unit minimized the number of filings, although the number of mail and personal inquiries did not perceptibly fall off. The government buildings are being used as far as possible for the temporary shelter of incoming settlers.

The Secretary of the Interior has just decided a question of some importance to the water users on the projects under the Reclamation Act. It deals with the situation arising during the pendency of proceedings for the cancellation of an entry and a water right application on account of failure to make two payments when due.

As it may not always be possible to conclude these proceedings in the two or three months prior to the opening of the irrigation season, the question has arisen whether water could be furnished for land while the matter of cancellation of the entry and water right application was under consideration.

The Secretary has just held that if the water user pays the charges for operation and maintenance due at the beginning of the irrigation season, water might be furnished to him, upon the distinct understanding, however, that if his entry and water right application should be canceled before the end of the season his right to the use of water would immediately cease, and he would also forfeit to the United States the amount which had been paid for operation and maintenance. This will enable the water user to cultivate his land and perhaps raise crops while the question of cancellation is pending.

Ranch Home in the Salt River Valley, Arizona.

The same rule would, of course, be applied so far as the circumstances permit to the case of lands in private ownership.

Contracts have been awarded for furnishing 104,600 barrels of Portland cement for various projects of the Reclamation Service, exclusive of the Pacific Division, for which contract of 25,000 barrels was recently awarded to the Pacific Portland Cement Company of Portland, Ore.

The new contracts are as follows:

To the Colorado Portland Cement Company, Denver, 10,000 barrels for the Uncompahgre project, Colorado, at $1.18 per barrel, and 16,600 barrels for the two projects in

Idaho at 94 cents per barrel, both f. o. b. cars at Portland, Colo.

To the Western Portland Cement Company, Yankton, S. D., 12,000 barrels f. o. b. cars at Belle Fourche, at $2.18.

To the Universal Portland Cement Company, Chicago, 3,000 barrels for Montana and North Dakota projects, at 95 cents f. o. b. cars at South Chicago.

To the Iola Portland Cement Company, Iola, Kas., 63,000 barrels at 80 cents per barrel f. o. b. cars, Iola; 30,000 barrels being for the Shoshone project, Wyoming, and 33,000 barrels for the projects in the Southern Division, embracing Arizona, New Mexico, Texas, Utah and southern California.

The Secretary of the Interior has approved an increase in the price asked for lands of the Northwestern Improvement Company under the Lower Yellowstone irrigation project, Montana-North Dakota, to $3 per acre.

On April 5, 1905, this company, which owns certain lands under the Lower Yellowstone project, said lands having been previously granted by the United States to the Northern Pacific Railway Company, declared in a letter to the Secretary of the Interior that it would freely co-operate with the secretary in carrying out the plans of the Reclamation Service so far as the disposition of lands owned by it was concerned and in other matters over which it had control, and that it would offer said lands for sale at $2.50 per acre.

Since that time the company has transferred to the United States certain canal rights of way which considerably decreased its acreage, and in order to cover this loss, taxes, losses by erosion, etc., the company will be permitted to make a charge of $3 per acre. Railroad lands which lie outside the project and which are not irrigable are selling today for $12 an acre.

After several conferences with Mr. Richard Shore Smith, attorney representing the Klamath Water Users' Association, Secretary Garfield has decided that he can authorize no change in the method of repayment of the construction charges for building to works.

As the matter now stands, the portion of the instalment which covers the charge for operation and maintenance for 1909, namely, 75 cents per acre, must be paid on or before May 1, 1909, and no water will be furnished until this portion of the charge is paid. That portion, however, which is to be credited to building, namely, $3 per acre, while it is due and payable on or before May 1, 1909, may remain as a charge against the land without penalty for default until May 1, 1910. Thus the water users who make application for water rights at $30 per acre before June 15, 1909, may have water supplied on payment of 75 cents per acre, and no further payment need be made until May 1, 1910. The water users may then discharge the portion of the installment due on account of the building charge from the proceeds of the season's irrigation.

(Continued on page 153.)

CAREY ACT LANDS SURROUND SHOSHONE, IDAHO.

BY H. A. THOMAS.

To the masses the term "Carey Act" signifies but little. To the vast industrial army, however, who have availed themselves of its benefits in that spacious reclaimed empire of sunny southern Idaho, where "irrigation is king," it represents a home and independence for themselves and a heritage for posterity.

The "Carey Act" had its origin in a resolution drafted by Judge Carey of Wyoming. This bill was enacted into a law by Congress August 18, 1894. The legislature of the state of Idaho, at its third session in 1899, supplemented this act by a statute that provided for the acceptance from the United States government of the grants of arid lands and for their reclamation, disposal and occupation. Idaho is the first state to have availed herself of the opportunity of reclaiming the entire original grant consisting of 1,000,000 acres, and as a result of the enterprise exhibited by her people, an additional 2,000,000 acres was readily granted by Congress in 1908 to be reclaimed under the provisions of this beneficent act.

The real object of the law is to enable persons of moderate means to secure a farm and a home on easy, annual installments, which may cover a period of ten years. Throughout the process of construction of the irrigation works, and during all sales of Carey Act lands, and in fact until such time as the irrigation works have been turned over to the settlers, the State Land Board supervises and regulates all matters of interest to the settler. The act provides that any citizen of the United States over the age of twenty-one (excepting married women) may file on land to the extent of 160 acres, or any legal subdivision, regardless of homestead, desert, timber or other government rights already exhausted. A portion of your Carey right may be used on one segregation in the state and another portion under a different project. Filing on less than 160 acres does not exhaust your right. When an entry is made, the entryman may, if he so desires, begin improving his land, and if he has one-eighth of his entry under cultivation; that is, seeded and ready for irrigation when the water is ready for delivery, and has actually irrigated one-eighth of the whole tract, he may at once publish his notice to make final proof, which is done by publishing in some newspaper published in the county where the land is situated during the four weeks preceding the date set for making final proof, and during all of this time he must reside on the land, and, if married, he must establish his home with his family. In this way title can be secured with only about thirty days' residence. After final proof, residence on the land is no longer required to hold title, because upon completion of final proof the state issues to the entryman a patent to the land. However, residence must be established within six months after water is available, and such residence maintained until final proof is completed, which can be done in thirty days or take the full limit of three years.

This act also permits one person to file upon land for another by proxy, so that by giving a power of attorney you may secure land through an agent or friend, and your actual presence on the land will not be required until water is ready for delivery, or within six months thereafter. As the land can be prepared and sown to crop by an employe, a person living in the east can come west at irrigating season and obtain title in a month or six weeks' time.

Practically all the Carey Act land of this state is situated in the southern portion. The first opening of importance, comprising 240,000 acres in the Twin Falls segregation, occurred in 1905. The first disposal of land under this act in Lincoln county consisted of 30,000 acres and was in 1907 at Milner. In November of the same year the North Side segregation of 150,000 acres was put on the market, and is now entirely occupied; subsequent to this opening 80,000 acres, including part of the Big Wood river and Clover Creek projects, have been sold. Forty thousand acres just north and west of Shoshone is at present on the market, and on June 8, 1909, 50,000 acres of choice land bordering on the eastern limits of Shoshone will be disposed of by drawing.

The various Carey Act segregations, the Minidoka Government project of 80,000 acres, together with the lands under private ownership, give Lincoln county, of

which Shoshone is the capital and commercial center, an area of over 600,000 acres of highly productive, irrigated soil. Within the past few weeks the United States Government has withdrawn from entry in this county an additional 300,000 acres of arid land. This immense body of land extends from within a very few miles of Shoshone eastward and adjoins the Minidoka project. This will be reclaimed by pumping stations, the power to be generated at the big Government dam on the Snake river east of Rupert. When the water is delivered on this tract, and when the projects now in course of construction are completed, Lincoln county will have the enormous sum of 1,000,000 acres of unequaled crop-producing soil—an area equal to the entire amount first appropriated to each of the semi-arid western states—a veritable empire.

A farmer in this irrigated section does not depend on the weather for a successful crop. He regulates the rainfall and is the manufacturer of farm products. He makes his plans knowing that he can count on abundant sunshine and can regulate the moisture to the requirements of each crop.

Professor Holden, the great corn expert of the Iowa Agricultural College, visited this section last October, and upon his return home said: "To the eastern farmer living on high-priced land, having two or three sons, knowing they cannot all farm the home place, and wondering what is to be done, I most certainly recommend southern Idaho. To the renter or the man with little money who cannot afford to buy $100 to $125 land in Iowa, Illinois and other eastern states, I give the same advice—get some southern Idaho irrigated land while it can be had as cheap as it is today. It is surprising the class of men you find out there. I found college graduates living on these ranches and they all said they were there because there was more money and independence in it than in the practice of their professions."

With the peopling and development of this vast area it is not difficult to anticipate the effect on our growing city. The dreams of the most optimistic will be more than realized. Our present limits will be extended, new additions made, residences will give way to business structures, commission merchants will, with their consignments of nutritious products, make glad the appetites of inhabitants in the great cities, and the masses will hail with enthusiasm that worthy monarch of the industrial and agricultural realm.—Irrigation.

"ONE GOOD INVESTMENT IS WORTH A LIFETIME OF LABOR."

We carefully "cruise" every forty acres in each segregation opened for entry under the Carey Act, locate settlers on choice land only, in person or by power of attorney, buy and sell Carey Act relinquishments and cheerfully reply to all inquiries.

Standard References

SHOSHONE LAND COMPANY, Shoshone, Idaho

Do Your Farming with a **HART-PARR GAS TRACTOR**

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The latest development in labor machinery is the **HART-PARR GAS TRACTOR,** which is revolutionizing farming methods. They displace many men and more horses, and are always ready for service and eat nothing when standing idle. Think what it means to have cheap power and plenty of it, always at your command. You can use these Tractors for plowing, discing, seeding, harvesting, threshing, hauling, hay baling, feed grinding, running irrigating pumps—in fact, all kinds of heavy farm work.

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Our 48-Page Illustrated Catalog Tells You All About Them.

HART-PARR CO., 242 Lawler Street, Charles City, Iowa

When writing to advertisers please mention The Irrigation Age.

(Continued from page 151.)

Mr. Smith also submitted that the maintenance charge should be paid out of the reclamation fund, that the Reclamation Act has always been construed to mean that all expenditures on a project for construction, operation and maintenance must be returned to the fund. In view of the numerous instances where Congress has thus construed this feature of the Reclamation Act there is no doubt of the authority of the Secretary of the Interior to collect such charges as he may deem proper on account of operation and maintenance of the irrigation works.

A protest was also made against the charge during 1907 and 1908 of $1.50 per acre, in view of the fact that the maintenance and operation charge in the public notice recently issued was placed at 75 cents per acre. It is manifest that the expense of operation and maintenance for the delivery of water to a few thousand acres is much greater per acre than for thirty to forty thousand acres.

Contract has been awarded to the Fulton Engine Works, Los Angeles, Cal., to supply pump, pit gates and controlling mechanism for the Minidoka Irrigation Project, Idaho. The contract amounts to $10,994.

CORRESPONDENCE

We are presenting herewith a letter received recently from a subscriber at Jerome, Idaho, and will request our readers who have had experience along this line to send us such information as may assist him. We have informed our correspondent that his letter will be published, and such replies as are received will be submitted to him. We have explained to him that the matter is treated fully in our Primer of Irrigation.—(Ed.)

"Jerome, Idaho, Jan. 22, 1908.

"Mr. D. H. Anderson, Editor of the Irrigation Age:

Dear Sir—I have just been reading your book entitled "Primer of Irrigation," and am especially interested in your treatment of sub-irrigation or infiltration. Am an owner of land on the north side of Snake river, water to be turned on the 1st of April next. On my land are a number of heavy slopes, soil quite sandy and probably two feet deep, underlaid by a compact subsoil, through which water would penetrate very slowly. At varying depths over the tract we find lava rock, porous and generally shattered. Therefore there is no ground water table. Now, I had planned to lay four-inch tile about two feet deep probably fifty feet apart, tile to be laid on the level with boxes at the end, so as to give water pressure at least one foot above the tile. Now, as the slope is about two feet in fifty, the pressure, gravity and capillarity would all tend to bring the water to the surface. Gates could be so arranged as to change the tile to a drainage system. This is practically, as I understand, your article applied to the conditions of my land. I see Professor King of the Wisconsin University discourages such a plan, claiming it will be impractical.

Now, I have not been a reader of IRRIGATION AGE for over a year, so you may have treated fully in regard to this matter. This reference to your journal reminds me that, as secretary of the Jerome North Side Farmers' Association I would be pleased to act as your agent for IRRIGATION AGE and other publications. If you send me copies I will distribute them at our next meeting, the first Wednesday in January. Would be glad to hear from you either directly or through paper.

"Rockford, Ill., Oct. 6, 1908.

"Chicago House Wrecking Company, Chicago, Ill.:

"Gentlemen—I received my car and have it unloaded and find it all right. (Signed) "E. R. CRETSLEY."

Send $2.50 for The Irrigation Age one year and The Primer of Irrigation

IRRIGATED LAND

Open to Settlement

Some of the richest and most productive farm land in the world lies along the Shoshone and the Big Horn Rivers in the "Big Horn Basin" of Wyoming. Over ten million dollars is being spent by the United States Government and by private enterprise in building great concrete dams and ditches in order to lead an inexhaustible supply of water to irrigate some of the best of these lands and make them independent of rainfall. A great portion of this work is completed, and these lands, with a perpetual supply of water for irrigating them, are now offered you on reasonable terms.

This is an Unusual Opportunity

to get a wonderfully productive farm, with water whenever you want it, regardless of rainfall; in a country where a single crop can be made to pay for the land; where 50 bushels of wheat or barley, and 75 bushels of oats are commonly grown to the acre; where fruits grow luxuriously and where the glorious air and sunshine, summer and winter, make life a joyous thing.

This wonderful country is developing fast. Churches and schools abound. The population is intelligent, Godfearing and law-abiding, and any man out there who is half a man has the opportunity to make himself independent.

Land in this great country is going fast. If you have any thought for the welfare of yourself or children, find out all about this opportunity to-day.

Send for our new folder with large map, and **also folders issued** by the private irrigation companies and by the United States Government Reclamation Service **giving all information about these lands, terms, etc. Free for the asking.** Study these folders and then **come with me** on my next excursion to the Big Horn Basin and see for yourself. My excursions, which I personally conduct, leave Omaha on the 1st and 3d Tuesday each month, on which days reduced railroad rates are in effect. My services are free to you.

Burlington Route

D. CLEM DEAVER, General Agent
Landseekers' Information Bureau,
59 Q Building, OMAHA, NEB.

N. B.—The winter weather in the Basin Country is fine and lands can usually be seen to advantage all Winter,

DIDN'T WANT THE JOB.

During a recent examination of applicants for the position of mail carrier, a colored boy appeared before the civil service commission.

"How far is it from this earth to the moon?" was the first question asked him. "How fah am it from de earf to de moon?" he repeated, as he began to reach for his hat. "Say, boss, if you's gwine to put me on dat route, I doesn't want de job," and with that he left as though he were escaping from some calamity.—The December Circle Magazine.

There is considerable feeling in congress and especially among western men that the forest service is branching out too rapidly and is fast becoming one of the most expensive bureaus of the government. A number of western senators and congressmen are not in sympathy with the forestry policy and they are out in the open setting traps for Baron Pinchot and his merry men. The elements are combining to hold down the appropriation for the forest service at this session and it will probably be no more than a year ago before the statesmen had gotten onto some of Pinchot's curved pitching. If we had our say about the thing the congressional graft would be cut off altogether and the whole hungry horde would be turned out to browse in the sand hills among the other goats.—*Denver Field and Farm.*

20 PACKAGES FLOWER SEEDS 10¢
16 kinds Aster, 10 Pansy, 10 Phlox, Sweet Peas, 2 Salvia, 12 Balsam, 10 Pinks, 18 Poppy, 10 Candytuft, 2 Sunflower, 12 Zinnia, 6 Larkspur, 10 Verbena, Forget-me-not, 20 Portulaca, 12 Marigold, Four O'clock, 10 Petunia, Sweet Alyssum, 10 Nasturtium, Sweet Mignonette, 8 Calliopsis. All of the above sent to any address, postpaid, for 10c. silver or 6 two-cent stamps.
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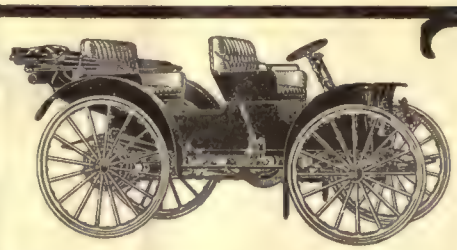
50 BULBS 25 Cents Will grow in the house or out of doors. Hyacinths, Tulips, Crocus, Gladiolus, Tuberoses, Fuchsias, Begonia, Oxalis, Jonquils, Daffodils, Chinese Lily, Dewey Lily, Gloxinia, Lilies of the Valley. All postpaid, 25 cts., in stamps or coin. As a premium with these Bulbs we will send **FREE** a big collection of Flower Seeds. Over 200 kinds, and a fine collection of Souvenir Postal Cards, with Catalogue.
AMERICAN NURSERY, SOMERVILLE, MASS.

RANGER BARB WIRE
HEAVY SINGLE WIRE
STRONG. DURABLE.
The only absolutely successful single strand barb wire ever made.
M. M. S. Poultry Fence Saves 50%
We make the most complete line of Field, Hog, Poultry and Lawn Fencing in the country. Write for our new catalogue.
DeKALB FENCE CO., - DeKALB, ILL.
Southwestern Office and Warehouse, Kansas City, Mo

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.



THE CAR FOR BUSINESS OR PLEASURE

The International Auto Buggy has come to take the place of the farmer's carriage or runabout and the driving team.

It is carriage and team all in one. And anybody who can be trusted with a team of horses can operate it with perfect safety.

The Auto Buggy is emphatically the vehicle for country road travel. It has every advantage that the family carriage or runabout has and many advantages which these vehicles do not have. It is always ready to go anywhere. Rough, muddy or hilly roads do not impair its usefulness.

When there is a trip to town to make, or other errand to do, it is not necessary to take the team from the plow or to stop the farm work. It does not require to be watered or fed. It does not get "fagged out" as the horses do on a long journey. You can go at a faster clip than you can with your driving team and you can keep it up all day long.

Perhaps the greatest feature about the International Auto Buggy is its simplicity and easy control. There is nothing complicated about it, and any member of the family over ten years old can learn to run it in a very short time.

The Auto Buggy has solid rubber tires. There are no tire troubles. It is operated by a thoroughly reliable air-cooled gasoline engine. It is propelled by applying power to both rear wheels. It is chain driven. There are no cog wheels to break and put it out of action.

The Auto Buggy is a rare combination of both a pleasure and a business vehicle. The springs and comfortable seats make it easy riding. Passengers are protected from flying mud and water, no matter how fast the Auto Buggy is speeding. The rear seat and top may be removed, and the Buggy turned into a handy, light-running and capacious carrying vehicle. A ten-feed mechanical oiler makes oiling an easy matter. The tread is the same as that of a standard wagon. The seven gallons of gasoline which it carries is sufficient for a journey of 75 to 100 miles, making surprisingly cheap as well as pleasant transportation for its load of passengers.

The following letter is one of many we are receiving from all over the country, setting forth the complete satisfaction that the International Auto Buggy is giving:

New Brunswick, N. J., November 30, 1908.

INTERNATIONAL HARVESTER COMPANY OF AMERICA, Philadelphia, Pa.

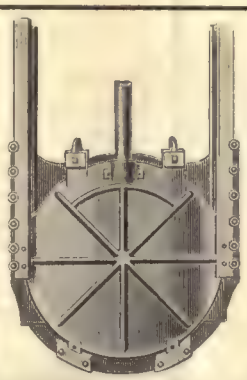
Dear Sirs: You will undoubtedly remember that I placed an order with you the past season for two Autos, one of which I have been using for the past six months, and I have certainly given it some of the most severe tests that a motor car could be put to, and it has overcome all obstacles and meets my approval in every respect. I have driven the car up and down steep hills, through mud and sand, and the power of the engine and the excellent control one has of the car make it reliable and dependable at all times. I also like your high wheels, solid tire, and for my own use the in real estate business and for a selling agent, am convinced that your cars are the best of their kind on the market today.

Yours truly, ALBERT SERVISS.

Take the matter up with the International local agent and get a catalog and further information. Or write the nearest branch house.

WESTERN BRANCH HOUSES: Denver, Colo.; Helena, Montana; Portland, Ore. Spokane, Wash.; Salt Lake City, Utah; San Francisco, Cal.

International Harvester Company of America, Chicago, U. S. A.
(Incorporated)

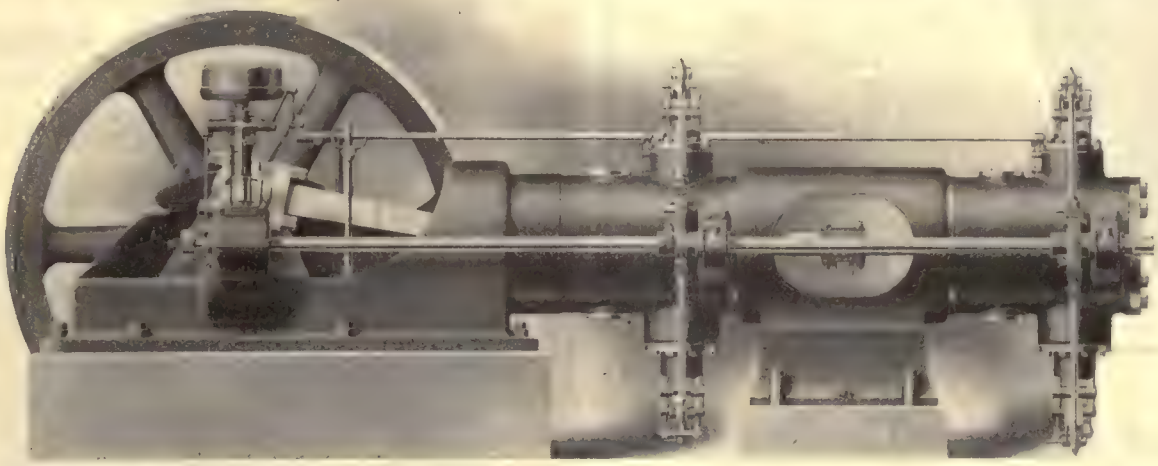


SLUICE GATES HEAD GATES and HOISTS FOR IRRIGATION SYSTEMS AND HYDRO-ELECTRIC PLANTS

COLDWELL-WILCOX CO.
FACTORY, NEW WINDSOR, N. Y.

Economical, Reliable Running Water Service
A constant supply wherever you want it. Automatic in action—no expense for power or repairs. It's easy with a
RIFE HYDRAULIC RAM
Large and small rams for Country Places, Irrigation, Supply Tanks, Town Plants, etc. For every foot water drops to ram it is raised 30 feet. 7,000 in use.
WRITE FOR FREE PLANS AND ESTIMATES
RIFE ENGINE CO., 2166 TRINITY BLDG., NEW YORK

The BUCKEYE FOUR-CYCLE GAS ENGINE



SIMPLE IN CONSTRUCTION - ECONOMICAL IN OPERATION - RELIABLE

CATALOG ON APPLICATION

BUCKEYE ENGINE COMPANY, - - Salem, Ohio

ARE YOUR RESERVOIRS AND DITCHES READY

For This Season's Irrigating?

Now, while you have the time and before irrigating begins, you should examine the headgates in your reservoir and on your ditches, and get them in shape for the year. Don't wait until your are busy getting in your crops, and the water has been turned into the ditches. If your gates need repairing or replacing, it would pay you to investigate NORTHWESTERN IRON HEADGATES before putting in any more wooden gates. What you have already spent for repairs on your wooden gate and what you will have to spend this year, would more than pay for my iron gate.

The headgate is really the key to your water supply. and it doesn't pay to take chances on a wooden gate breaking or washing out. Wooden gates have a habit of breaking just when you most need the water, as well as when you can least spare the time to fix the break. You naturally want to make your water supply go as far as possible, and for this reason you cannot afford to have a leaky gate or one that may break, or which takes much time to regulate.

The NORTHWESTERN line includes gates for all purposes from the small lateral ditch to the large reservoir, and you will find one that is particularly adapted to your purpose. NORTHWESTERN gates are made for connecting to all kinds of pipe; for bolting to wooden boxes; or for setting in masonry.

One of the advantages of NORTHWESTERN gates is that they are complete in themselves and, therefore, can be easily put in by anyone. Once set up they will last a lifetime without any repairs. All bearings being planed and ground to an absolutely water-tight joint, the gates cannot leak. The screws having square, lathe-cut threads, the gates can be very easily and quickly operated and regulated, and cannot stick.

Ditch companies appreciate the value of the new, patented locking devices on NORTHWESTERN gates. By means of this device the gates can be so adjusted and locked that there will be delivered only the amount of water the consumer is entitled to. At the same time the consumer may, if he desires, reduce the flow or shut it off completely. It can also be locked so that the gate cannot be moved at all.

NORTHWESTERN headgates have now been on the market six years and better gates cannot be made for the price. The first cost of an iron headgate is not the only thing to consider. The cheapest gate is the one that lasts the longest.

The best way to prove that my gate is the best is to compare it with other gates. I am glad to send my gate to anyone for examination. and the other manufacturers must do the same or else admit that NORTH- gates are the best. A trial will show you that my gates possess every feature required by a practical irrigator, and many advantages not to be found in any other gate.

Send for my catalogue and get my price on a gate particularly adapted to your requirements.

C. D. BUTCHART,

611 Continental Bldg.

DENVER, COLO.

Mayer

Irrigators', Engineers', Prospectors' and Miners' High Cut Boots

Expressly adapted for irrigation work. Made of the highest quality and stock. Strong, comfortable and dependable. Many styles. Protect the feet and keep them dry. Can be secured through shoe dealers. If not obtainable, write to us.

For a dress shoe, wear
"HONORBILT"

F. Mayer Boot & Shoe Co.
Milwaukee, Wisconsin

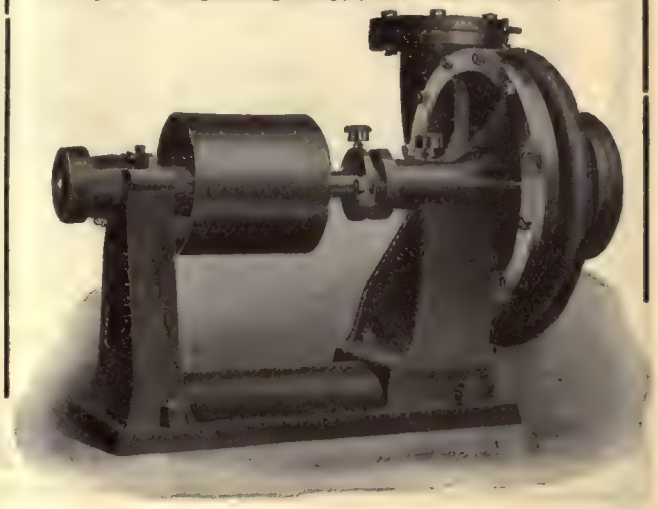
25% SAVED OF THE EXPENSE OF IRRIGATION

Send for our booklet, "COST OF IRRIGATION." It will save you money in irrigating.

We guarantee 25% more water with the same power, or the same amount of water with 25% less power than other make of pumping machinery. We have proved this greater efficiency by hundreds of tests and we are ready to prove it again.

Bulletin No. 104 illustrates and describes irrigation machinery

THE AMERICAN WELL WORKS
AURORA, ILLINOIS, U. S. A.
Chicago Office, First National Bank Building.
Morse Bros. Machinery & Supply Co., Denver, Colo.
Zimmerman-Wells Brown Company, Portland, Ore.
Cal. Hydraulic, Engineering & Supply Co., San Francisco, Calif.



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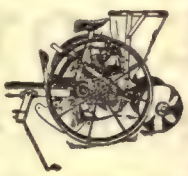
POTATOES PAY

Make them pay by using the machines that really do the work—

CUT, PLANT, SPRAY, DIG and SORT



There's nothing in potato machinery up to

ASPINWALL EQUIPMENT

Write for copy of our **free book** telling how to make money, growing potatoes.

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Pioneer Makers of Potato Machinery

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That Settles It

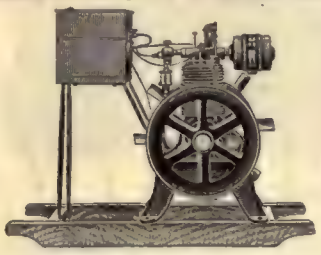
A Sticky Preparation Applied Directly to the Bark of Trees

Will not injure trees. Remains sticky three months fully exposed to weather. Easily applied with a small paddle. A pound makes a band 7 to 8 feet long. Once applied needs only occasional inspection to remove leaves, etc. Unequalled to protect trees from Spring and Fall Canker Worm, Tussock, Gypsy, and Brown Tail Moths, Fall Web Worm, Bag Worm, Climbing Cut Worm, or any climbing or creeping pests. Should be used before the insects begin to ascend the trees. **Put up in 1, 3, 10 and 20-pound cans.** Price 1-lb cans 30c, 3-lb cans 85c, 10-lb cans $2.65, 20-lb cans $4.80. ☞ **Send for Booklet.**

THE O. & W. THUM COMPANY, Grand Rapids, Mich.

BE SURE TO GET THIS

Every reader of The Irrigation Age who is interested in farm power of any kind should



send to-day for our catalog of the WHITE LILY GASOLINE ENGINE.

It is the best, simplest and cheapest 3-H. P. gasoline motor in the world. Four cycle—air cooled—automatically governed.

FULLY GUARANTEED

IT'S THE ENGINE YOU NEED

Will do more work with less trouble than any other 3-H. P. engine. Runs smoothly without jar or vibration. Absolutely dependable. Get our prices and special proposition. Write today.

WHITE LILY MFG. CO.,
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$1,000 Reward

for its equal. Wind power doubled. Two 14 ft. wheels work on same pinion; second wheel gives more power than first.

A Governor That Governs in all winds. Develops 10 full h. p. in 20 mile wind. All power needed for farm, shop, irrigating, etc. Ask about our self-oiling, self-governed, single wheel pumper—also Aermotor Husker. Ask for book 60

DOUBLE POWER MILL CO.
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34 YEARS GROWING EVERGREENS

and Forest trees. Over 38 tested hardy varieties. All Nursery grown. We have over 50 millions and ship safely to all parts of the country. Our trees live and grow, because they have good roots. Large as well as small trees supplied. $4.00 and up per thousand.

Our new catalog is a mine of information. You can have a beautiful Windbreak, Hedge, Shelterbelt or Screen with the hardiest of Evergreens at a very low cost. Our Bargain sheet describes 50 bargain lots from $1.00 per 100 and up. Millions of Nursery grown Forest trees, Shade and Ornamentals, Shrubs, Roses and Vines. Send today for free Catalog and Bargain sheet.

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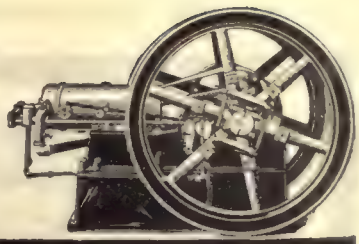
"ROCKFORD" **ROCKFORD ENGINES—ALL STYLES From 3 to 30 H. P.** "ROCKFORD"

Before you contract or buy, get the Rockford proposition. Address Dept. 4, Rockford Engine Wks. Rockford Ill.

Rockford Girl is the engine that will please

Neat—Nobby—Handy

A RELIABLE WATER SUPPLY FOR IRRIGATION



AFTER preparing the ground, sowing the seed and getting the crop well started, your greatest concern is for a reliable water supply. You *must* have water to irrigate in season. Your crop may be ruined in a single day for the want of it.

You have a dependable supply of water in the form of low lying lakes, ponds and reservoirs. The problem is to raise this water so you can apply it to the land.

Do you know that you can raise such water and make it available for irrigating all your lands by means of the powerful I.H.C. gasoline engines?

They will not only pump water for you in large quantities, but they do it economically. It costs practically nothing to keep an I. H. C. engine in repairs, and the expense of operating it is a very small item compared to the value of the crops you can raise.

An I. H. C. engine as the basis of your irrigating plant makes you master of the situation. You are independent of the ditch and ditch officers You have a water supply that is all your own. You can start your engine any time and apply water to your land whenever the crops require it.

Keep an I. H. C. engine supplied with gasoline and it runs dependably, hour after hour, requiring but very little attention. You need return to the engine only occasionally, so you are free to spend practically all your time handling the water in the field.

One of the advantages in purchasing an I. H. C. engine is that the engine can be used for many other purposes besides pumping. It is a general all-round farm engine—an absolutely reliable source of cheap power for operating the grindstone, churn, fanning mill, feed grinder, separator, bone cutter, washing machine, etc. I. H. C. engines are made in many styles and sizes, so that you will be able to find just the engine you want. There are

I. H. C. Vertical Engines—made in 2, 3 and 25-horse-power.
Horizontal (portable and stationary)—in 4, 6, 8, 10, 12, 15 and 20-horse-power.
Gasoline Tractors—in 12, 15 and 20-horse-power.
Famous Air-Cooled Engines—in 1 and 2-horse-power.
Spraying and Sawing Outfits in various styles and sizes.

Call on the International local agent handling I. H. C. engines. He will supply you with catalogs and full particulars. Or, if you prefer, write to nearest branch house.

WESTERN BRANCH HOUSES: Denver, Colo.; Helena, Montana; Portland, Ore.; Spokane, Wash.; Salt Lake City, Utah; San Francisco, Cal.

International Harvester Company of America, Chicago, U. S. A.
(Incorporated)

GOOD IRRIGATION POWER

Is the first step in preparing for bountiful crops. Don't depend on weather, wind or streams but use a

WITTE GASOLINE OR KEROSENE ENGINE

to raise water in any quantity. It makes you independent and saves paying out profits. Our plants sold under

FIVE YEAR BOND GUARANTEE

Special proposition to introduce in new localities. State size engine wanted or quantity and lift of water when writing.

WITTE IRON WORKS CO.
505 West 5th Street,
KANSAS CITY, MISSOURI

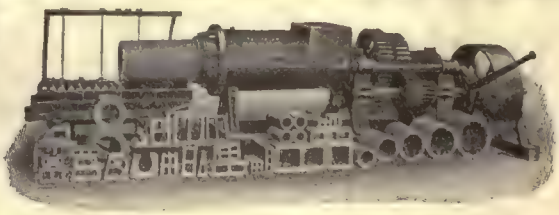
Reason Says: "Clip Horses"

In the Spring = *They look, feel and work better, clean easier, and if for sale bring more.*

The Stewart No. 1 Ball Bearing Clipping Machine

Is the best on earth at any price. Ball bearings, file hard cut steel gears. Runs easy, clips fast, lasts long. **Guaranteed for 25 Years.** Only **$7.50** at dealers, or send $2.00 and we will ship, balance C. O. D. Write today for free big new catalogue.

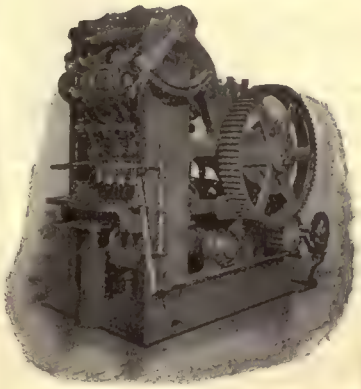
Chicago Flexible Shaft Co., 86 LaSalle Ave., Chicago



Centennial Auger Machine

Mascot Auger Machine

Wheelbarrows and Trucks



Dry Press, 5 styles

Eagle Repress

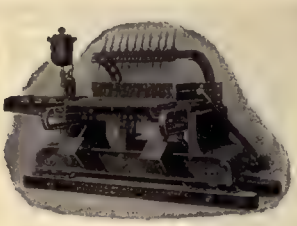
Clay Working Machinery

"BUILT RIGHT—
RUN RIGHT"

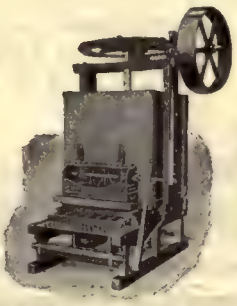
We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

The American Clay Mch. Co...Bucyrus, Ohio

Dry Cars, all kinds

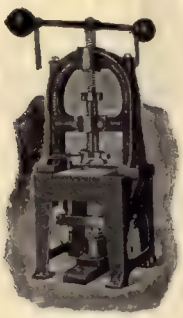


Hand and Power Cutters

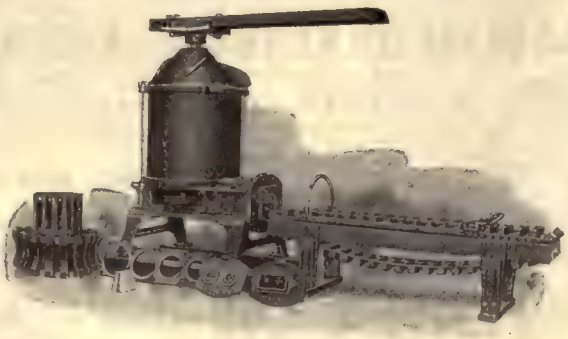


Soft Mud Machines, Horse and Steam Power

Disintegrators



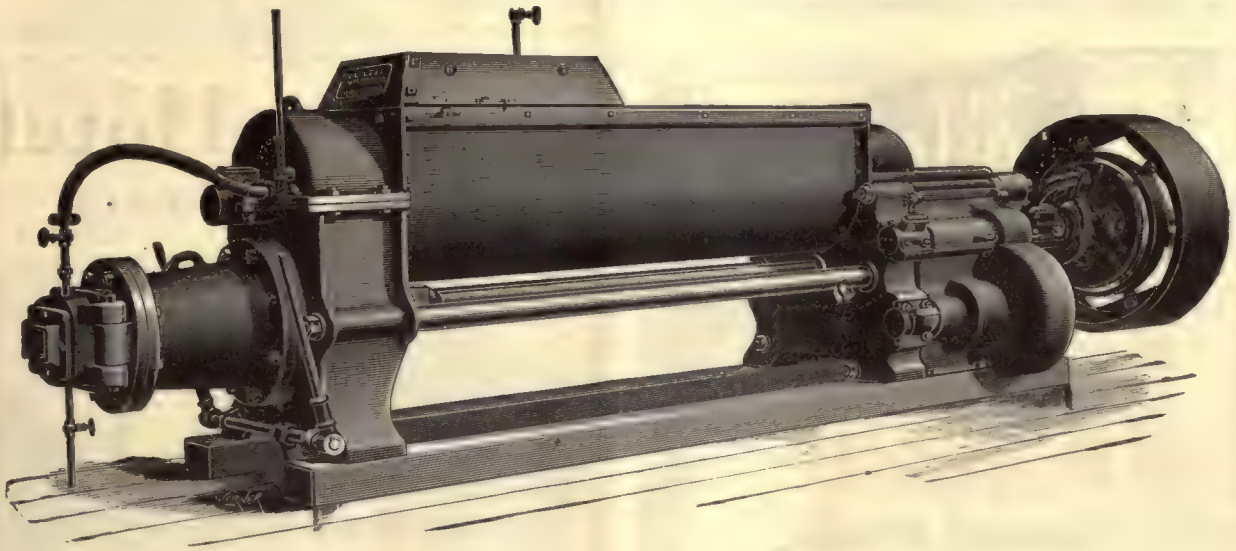
Hand Power Screw Press



Horse Power Plunger Machine

Products of our Auger Machines

UNION MACHINES
WITH PUG MILLS COMBINED



FIVE SIZES ALL CAPACITIES

Outfits for Drain Tile, Hollow Ware, Building and Paving Brick and other Clay Products

If interested write us for particulars and estimates.

E. M. FREESE & CO.
GALION, OHIO

Send $2.50 for The Irrigation Age 1 year, and The Primer of Irrigation

The Chas. T. Manning Realty Co., Ltd.

SOLE SALES AGENTS

The Gooding Townsite Company, Ltd.

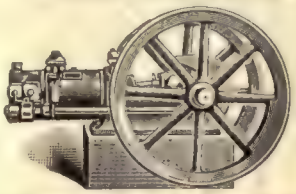
RESIDENCE LOTS.
BUSINESS LOCATIONS.

Improved—Irrigated Lands—Unimproved.

GOODING, IDAHO.

Otto Suction Gas Producers
And Otto Engines

Are Reliable and Can Be Operated By Men of Ordinary Intelligence



J. A. Witter, Engineer for the Beaver Crossing Electric Light & Power Co., Beaver Crossing, Nebr., writes:

"Please send me a book of instructions on handling and running your gas producer and engine. I have been running this one on horse sense, but that might not work at al. times. Plant works fine.

This man without special instructions, but with the use of "horse sense" causes his plant to work fine. There is a volume of praise for "OTTO" machinery in Mr. Witter's short letter.

The Otto Gas Engine Works
Philadelphia, Pa.

It's Easier Quicker Cheaper

To Level Fields, Make Ditches Cut and Clean Laterals

with our 20TH CENTURY GRADER. Cuts "V" shaped ditches 30 in. wide, 15 to 18 in. deep, once up the field, once back; if ground is mellow—no plowing. It is light but very compact and strong. Weighs 600 lbs. Can set reversible blade at any angle up to 50 degrees. Can raise and lower it, little or much, from seat, in a second. Blade 6 ft. long. Machine all steel except tongue. The

20th Century Grader

levels seed-beds, cuts sage-brush with special attachment, shaves down hummocks, digs shallow or deep ditches, grades roads, etc. Write now for newly written, handsome catalog with brand-new photos. It will answer your quest ons and make you want a **20TH CENTURY GRADER.** Address today.

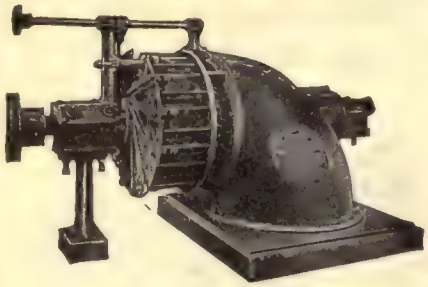
THE BAKER MANUFACTURING COMPANY
277 Dearborn Street
CHICAGO, ILL.

Oxford Hotel

DENVER, COLORADO

At the OXFORD HOTEL, Denver, Colorado, you will find all the leading men interested in irrigation and all of its branches.
Denver is the logical irrigation center of the United States. You will find nearly everyone engaged in or interested in irrigation projects stopping at the Oxford Located half a block from the Union Depot: Fire Proof, Modern, European Plan and Popular Prices

THE HAMILTON-BROOKS CO.
PROPRIETORS



SAMSON TURBINE

When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the HIGH SPEED of the SAMSON, for a given power, lighter and consequently CHEAPER transmission machinery can be used.

JAMES LEFFEL & CO., Springfield, Ohio, U. S. A.

Write Department K-2 for Catalog.

"The Piano with a Soul"

ECKERLE

"SOLD—when You're SATISFIED"

That's the way Eckerle Pianos find homes for themselves.

OUR NEW 60-PAGE ART COLOR CATALOG

will be sent free and postpaid to you if you ask for it. Then in the quiet of your own home you can, by means of these beautiful photographs and complete descriptions, read and learn just how **well** Eckerle Pianos are made, why they stay in tune so long; why they last a lifetime; why they always satisfy, and why it is called the "Piano with a Soul." This book takes you on a trip through one of the largest and best equipped piano factories in America, and explains clearly why Eckerle Pianos are **better** than other moderate price instruments. There are thirty-four of these important reasons which you should know about, scattered along the journey from lumber yard to shipping room. Send for this Art Color Catalog today. It shows our new 1908 styles in colors, quotes lowest freight-paid prices, explains our 4 different plans of payment, and tells you in the words of other buyers just what they have found the Eckerle Piano to be.

After you have read this book

through and talked the matter over with your family, you can take advantage of our fair and square **"Sold when you're satisfied"** offer, and we will deliver to your own home, freight and delivery charges paid, the style of Eckerle Piano you prefer, and let you give it a thorough 30 days' trial. Play it yourself; let your children try it; invite your musical friends to play on it, and when the 30 days are up, let us know whether the Eckerle—"The Piano with a Soul"—has found a home with you. You take no risk whatever in trying the Eckerle Piano in your own home, and we take but very little risk in making you this offer if you are really seeking earnestly for the best piano at a moderate "Factory to Home" price. Write a postal or a letter right now and ask us to send you the Art Color Catalog of the Eckerle—the piano that is not considered sold until you are fully satisfied that it is **the piano you want to place in your home.**

ALBAUGH-DOVER CO.
903-938 Marshall Boulevard
Capital $1,500,000 **CHICAGO, ILL.**

ALDOCO STEEL WIND MILLS

Only $37.40 and up for complete steel mill and steel tower. Aldoco Mills run smoothly, quietly, and easily, and require but the slightest breeze to set them in motion. They have solid tool steel wrist pins, and a special Rocker Arm Device. Our steel towers are strongly braced, well proportioned and fitted with ladders. Every mill fully guaranteed. Write us.

No. 13 D I A-7701-11.
Complete 8-foot wheel and 30-foot tower, total weight 940 pounds. Price..... $37.40

No. 13 D I A-7701-12.
Complete 8-foot wheel with 40-foot tower, total weight 1130 pounds. Price..... $43.85

No. 13 D I A-7702-20.
Complete 10-foot wheel with 40-foot tower, total weight 1260 pounds. Price..... $51.05

No. 13 D I A-7702-21.
Complete 10-foot wheel with 50-foot tower, total weight 1600 pounds. Price..... $60.05

ALL SHIPMENTS MADE FROM FACTORY NEAR CHICAGO

ALBAUGH-DOVER CO.
913-938 Marshall Blvd., **Chicago, Ill.**

NEW ALBAUGH-DOVER MODEL 5D-12 SEWING MACHINE

90 Days Trial

A $60.00 Machine From Factory to Home for

$17.95

The most wonderful offer we or any other house has ever made on a strictly highest grade ball bearing drop head sewing machine. Do not class this machine with the ordinary drop head sewing machines which you can buy anywhere at $25.00 to $35.00. At $35.00 this machine would stand alone as one of the greatest values ever presented, and now when we cut the price in two and ask only $17.95 for this beautiful piano-polished quartered oak case, with carved front and round corners, and this high arm automatic head fitted with best ball bearings and equipped with stitch regulator, double feed, spring tension, cylinder shuttle and automatic bobbin winder, also include a full set of attachments and accessories, the offer becomes the sensation of the season in sewing machine values. You don't need to take our word for it, but trust to your own judgment after you have tried the machine in your own home for 90 days. Order this machine on 90 days trial; use it alongside of any $60 Agency Machine made, and if you don't prefer the new Albaugh-Dover model No. 5D-12 machine, regardless of cost, send it back and get every cent of your money. You take no risk whatever. We can make quick shipment. Order today on 90 days trial. **PRICE $17.95.**

Albaugh-Dover Co., 905-938 Marshall Blvd., Chicago, Ill.

MORE MONEY
From Your Cows and Much Less Work In Getting It.

If you could see the Real "DIFFERENCE" between the NEW BUTTERFLY CREAM SEPARATOR and any other made—**Difference** in amount of the cream you get; **Difference** in the quality of cream; **Difference** in the way the machine runs. **Difference** in the number of times a minute you have to turn the crank; **Difference** in the way the milk is aerated and purified while being separated; **Difference** in the time and trouble it takes to clean the skimming device—you would say, as hundreds of others are saying today—"I'll get the NEW BUTTERFLY CREAM SEPARATOR."

If you could see how to make easily $10 to $15 more a year on each and every cow you keep, and still do it with less work for your wife and yourself, you'd say: **"I'll get a Cream Separator."**

OUR PATENTED ALUMINUM CORRUGATED SKIMMING DEVICE

makes the New Butterfly Cream Separator **different** and **6 times as efficient** as any other machine. Every drop of milk that enters the bowl of the New Butterfly Cream Separator is actually put through the skimming process **6 times.** This guarantees complete separation, and you can't fail to get **ALL THE CREAM.** New Butterfly Cream Separators are sold as they ought to be. Not by agents, but direct from our factory to your farm **Freight paid and on 365 days' trial.** Send today for illust'd catalog.

For average use, we recommend ***No. 4½****, capacity 450 to 500 lbs. of milk per hour.*

PRICE delivered at your town— **$39.80**

ALBAUGH-DOVER CO. **Capital $1,000,000**
925-938 Marshall Boulevard, CHICAGO, ILL.

A Complaint

from one of the largest buggy manufacturers in America.

In a private letter recently addressed to the Albaugh-Dover Company he makes this complaint, and appeals to us to raise our buggy prices.

> "Your prices are too low. We do not believe there is any other catalogue in existence (and surely no retail dealer or agent) selling a buggy as well made as your 14D-116, for instance, for less than $60.00, while your price is $50.00."

We call that a pretty convincing argument, and one that should mean more to you if you are going to buy a buggy, than all the extravagant claims made in the most beautiful colored catalog ever written. This letter proves that when it comes to buggies, **we are acknowledged privately by other manufacturers themselves to be leaders in price and quality.** Why shouldn't we tell you about it? You ought to know it, too.

We Make a Specialty of the Best Low-Priced Buggies in America

as well as the higher grades. No matter what kind of a buggy you want to buy, if you haven't gotten our catalog and price list you haven't struck **"rock-bottom"** in **buggy buying yet.** Our rigs are stylish, up-to-date, strong, and **built right from top to tire.** Above all, the price in every instance is as low as the quality of the job and our small profits will permit. Send today for our catalog and see for yourself why other manufacturers are complaining about our low "Factory-to-User" prices. Runabouts **$21.50** to **$82.00.** Top buggies **$28.50** to **$110.** Surreys **$58.50** to **$110.** **We have 35 styles of Top Buggies priced from $40 to $60.** Among these you are sure to find just the rig you want at a price much less than you have expected to pay. Every buggy is covered by our "Iron-Clad Guarantee." Write for catalog.

ALBAUGH-DOVER CO., 915-9 CAPITAL $1,000,000 MARSHALL BOULEVARD **CHICAGO, ILL.**

The RELIABLE LINE

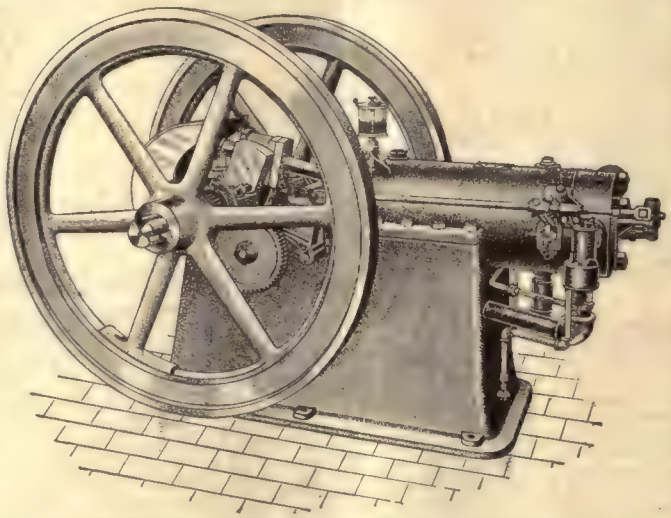
"Dempster" — That's The Name

High Class

Gasoline Engines

2 to 12 Horse Power

For Gasoline Kerosene and Alcohol



Four Cycle
Economical
Powerful

Will Run
Anything
Anywhere

Irrigating and Water Works Pumping Plants our Specialty

OUR LINE:

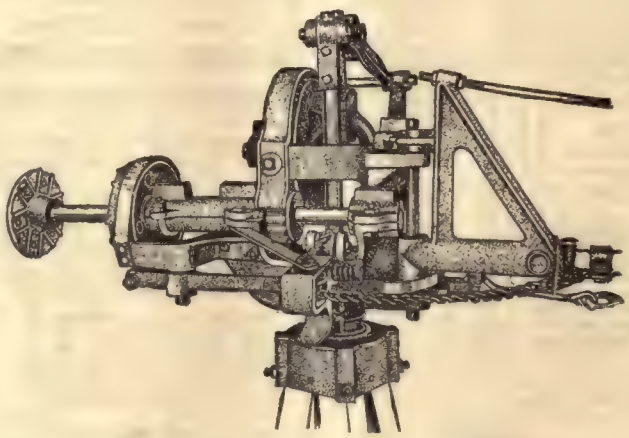
WIND MILLS — ALL KINDS OF PUMPS — WOOD AND STEEL TANKS
WELL MACHINERY — GASOLINE ENGINES — CULTIVATORS — FEED MILLS
GRAIN DRILLS — IRON PIPE AND CASING — COCKS AND VALVES
WELL POINTS AND STRAINERS — FARM AND RANCH WATER SUPPLIES

BEST TO BUY —— BEST TO WORK

Look Carefully at the Best

Windmill Head

Ever Made



See that

Extra Bearing

on the Wheel Shaft and the

Center Lift Crank Roller Rim Gears

and other good things

DEMPSTER MILL MANUFACTURING CO.

FACTORY: BEATRICE, NEBRASKA

Branch Houses: Omaha, Neb. Kansas City, Mo. Sioux Falls, S. D.

Mention Department "A" when you write

TWENTY-FOURTH YEAR

THE IRRIGATION AGE

PUBLISHED IN THE INTEREST OF IRRIGATION FARMERS, DEALERS IN AND MANUFACTURERS OF IRRIGATION AND GENERAL FARM MACHINERY.

VOL. XXIV. CHICAGO. APRIL. 1909. NO. 6

TITLE REGISTERED U. S. PATENT OFFICE

The Economy to Contractors

of using **Austin Drainage and Irrigation Earthwork Machines** comes from the fact that each machine is a special machine for doing one thing cheaper and better than any other machine can do it.

An Austin Drainage Excavator digs ditches cheaply because it constructs a ditch to template to the engineer's plans in one operation. Other machines rough out a channel which has then to be trimmed into ditch shape; the Austin Drainage Excavator finishes the ditch as it goes along **ready for water and ready for lining.**

Every Austin Machine for Drainage and Irrigation Earthwork performs one kind of work better than any other machine. This is the principle on which they were designed and are constructed.

We Sell Outright or Lease Drainage Machinery

OUR FULL LINE COMPRISES

The Austin Drainage Excavator
The Austin Levee Builder
The Austin Drag Line Excavator
The Austin Side Hill Ditcher
The Austin Highway Ditcher
The Austin Orange Peel Ditcher
The Austin Rolling Traction Platform
The Austin Tile Ditcher.
The Austin Stump Puller and Grubber

SEND FOR CATALOGUE "S"

F. C. Austin Drainage Excavator Company

Main Office: Railway Exchange, Chicago, Ill.

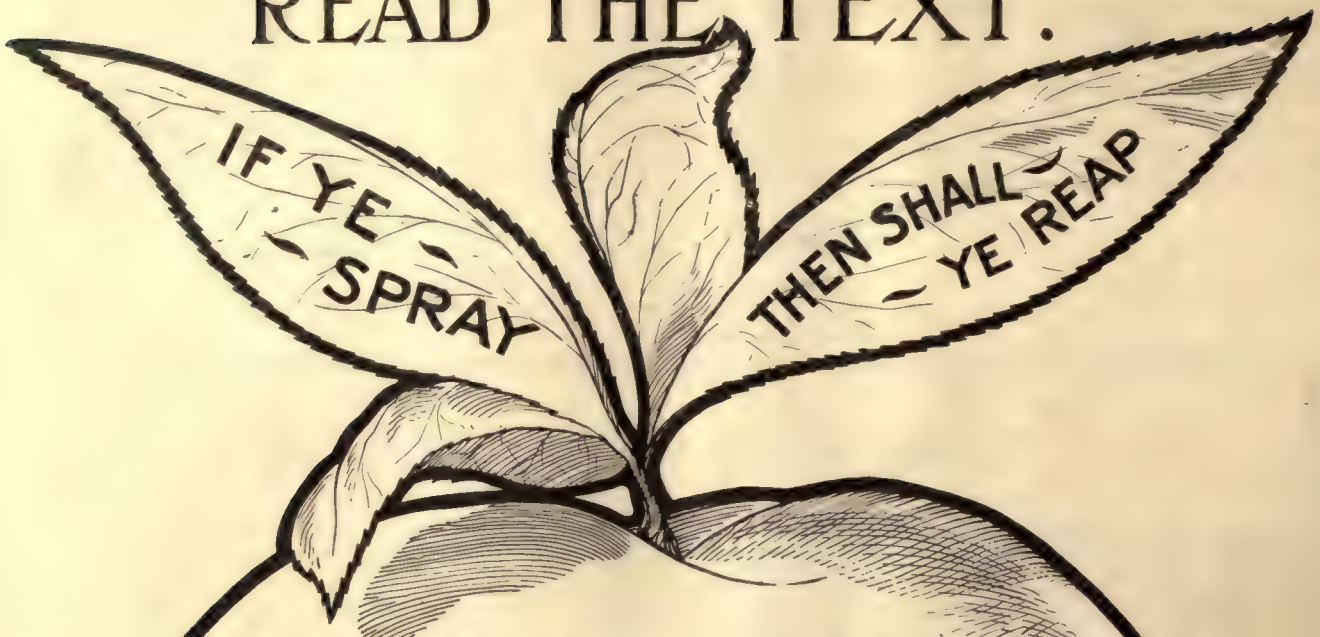
Morris Machine Works

BALDWINSVILLE, N. Y.

Centrifugal Pumping Machinery, designed for any irrigating proposition. Send details or specifications of what is wanted and we will recommend a pumping outfit to supply the need

New York Office, 39-41 Cortlandt Street
Houston Office, Cor. Wood & Willow Sts., Texas
Henion & Hubbell, Agents, 61 N. Jefferson St., Chicago, Ill.
Barron, Rickard & McComb, Agents, 21 Fremont Street, San Francisco, Cal.

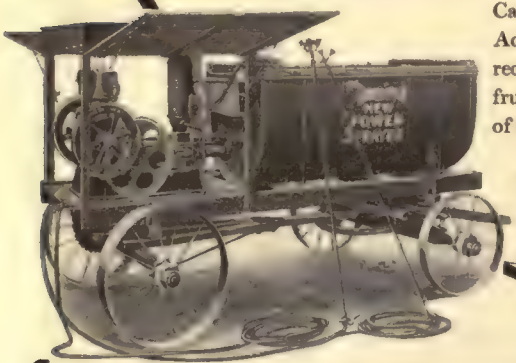
READ THE TEXT.



If you bunch the cost of spraying outfit, mixtures, labor, and all, the entire expenditure will not exceed a few cents per tree. Now weigh this against the *result* you obtain from the spraying. Figure on the number of bushels one average tree should yield—give it the limit, because it is to be sprayed—then multiply the highest market price that perfect apples bring per bushel, by this—deduct from the product the spraying cost, and see if each tree doesn't make a nice fat contribution to your bank account. Thousands of fruit growers have proven the above problem correct, time and time again. Of course a whole lot depends on your outfit, since the easier it works, the quicker the job is done and consequently a few more pennies can be deducted from the cost of giving each tree a new lease on life.

DEMING SPRAYERS

Pay the fruit grower because their ease of operation lessens the labor cost; their strong construction enables them to withstand hard usage; their brass working parts make them immune to any spraying liquid. They are well balanced, carefully made and thoroughly tested. We make Bucket, Barrel, Knapsack, Tank, Field and Power Sprayers, for Whitewashing and Fire Protection in addition to spraying. Write for our illustrated Spray Pump Catalogue and 12 page Spraying Chart. Add four cents to cover postage and receive a guide book, of value to all fruit growers who spray or who think of spraying.



THE DEMING COMPANY

SALEM — 780 DEPOT STREET — OHIO

HAND AND POWER PUMPS FOR ALL USES

HENION & HUBBELL — 61-69 N. JEFFERSON ST. — CHICAGO, ILL.

The Temple Irrigation Equipments the most Economical and Certain Means of Lifting Water

55 YEARS' EXPERIENCE

Write us for Information and Prices—State Requirements

CENTRIFUGAL PUMP AND GASOLINE ENGINE IRRIGATION OUTFIT.

The Temple Water Elevators --The Temple Centrifugal Pumps

Manufacturers of all kinds of Hand and Windmill Pumps

Also Manufacturers Single Cylinder, Double Cylinder and Four Cylinder Gasoline or Kerosene Engines

Briefly stated the advantages of our Double Cylinder Engines are as follows:

First—They are more economical in the use of fuel. On light loads one cylinder can be used, reserving both cylinders for heavy loads.

Second—Although weighing about one-half the weight of a single cylinder engine of same rated capacity, vibrations are practically overcome, demonstrating conclusively that in proportion to strain the double cylinder "Master Workman" is the stronger engine.

Third—The heavier weight of a single cylinder engine is due to the fact that it must have heavier fly-wheels in the horizontal type, and a longer, higher and consequently much heavier base than is required for the "Master Workman." The heavier the fly-wheels the greater the strain on the crankshaft, so you will realize that neither heavier fly-wheels or a heavier base contribute one iota to the strength of a single cylinder engine.

Fourth—When vibrations are overcome, as in the "Master Workman," the lighter the engine and the less cumbersome it is, the greater its sphere of usefulness and the cheaper and more convenient it can be handled.

Fifth—Lubrication in our engine is absolutely perfect. There is no forced lubrication, lubrication being by gravity. Certainty of lubrication is of vital importance in the steady running and operation of a gasoline engine.

Sixth—All mechanism is in full view, which will enable you to thoroughly understand the operation of a gasoline engine. The worst kind of complexity is concealed mechanism.

THE TEMPLE PUMP CO. Factory, 15th St. and 15th Place, near Canal St. Chicago, Ill., U. S. A.

New American Turbines

will improve your water power because they are EFFICIENT, POWERFUL and DURABLE.

Our line of

HEAD GATES and HOISTS

is the most complete on the market, and we have patterns for all sizes and types. Don't forget that a reliable Head Gate is one of the important parts of any power plant.

Send for Catalogue 25.

The Dayton Globe Iron Works Co.

Dayton Ohio

Bargain Sale of Pipe

We offer for immediate acceptance the following extremely low prices on high grade overhauled

WROUGHT IRON LAP WELDED PIPE:

2 inch O. D., per foot..... 5c
3 inch O. D., per foot..... 9c
3½ inch O. D., per foot.....11c
4 inch O. D., per foot.....14c
6 inch O. D., per foot.....23c

Other sizes in proportion.

All kinds of Valves and Pipe Fittings at very low prices.

PUMPS.

Here is a bargain list of Pumps worthy your consideration:

1—No. 6 Gould belt driven Centrifugal Pump, 8-inch suction, 6-inch discharge.....$ 60.00
1—No. 15 Morris Centrifugal Pump, 18-inch suction, 15-inch discharge, direct connected to a 10x10 Duplex steam engine.. 750.00
1—Tabor Centrifugal belt driven Pump, 4-inch suction, 3-inch discharge..... 30.00
1—Morris Centrifugal belt driven Pump, 4-inch suction, 3-inch discharge..... 30.00
2—Rumsey Submerged Centrifugal Pumps, belt driven, 3-inch suction, 2-inch discharge 20.00
1—Worthington Duplex Steam Pump, size 18x12x10, suction 8-inch, discharge 7-inch 350.00
1—Worthington Duplex Steam Pump, size 14x7x10, suction 5-inch, discharge 4-inch. 200.00
1—Knowles No. 9 Single Acting Steam Pump, size 14x8x12, suction 4-inch, discharge 4-inch, brass fitted..... 125.00
1—Wheeler & Tapper Steam Pump, size 20x 13x12, suction 8-inch, discharge 6-inch.. 375.00

These Pumps are thoroughly overhauled and put in first-class condition. They are tested out with water and steam.

BARGAINS IN STEAM ENGINES.

1—24x48 R. H. Sioux City Corliss Engine.
1—22x42 Bates Corliss Engine, rope driven.
1—18 in. x 42 in. R. H. Hamilton Corliss Engine.
1—16x16 Erie Ball C. C. Auto Engine.
1—13x12 N. Y. Safety C. C. Auto Engine.
1—16x24 L. H. Atlas Automatic Engine.
1—15x16 R. H. Buckeye Auto Engine.
1—10x16 L. H. Brownell Auto Engine.
1— 5x 6 Stroudsburg D. C. D. D. Hoisting Engine and Boiler.

Write for prices.

GASOLINE ENGINES.

This is our strictly brand-new "Success" Gasoline Engine, which we furnish with five years' guarantee and thirty days' free trial:

2 H. P.....$ 49.75
4 H. P..... 96.75
7 H. P..... 177.50
10 H. P..... 265.00

MISCELLANEOUS SUPPLIES.

All kinds of bargains in the way of material and supplies. "Everything under the sun," all at a 30 to 60 per cent saving.

Write for our Special Free Illustrated Catalogue No. 803.

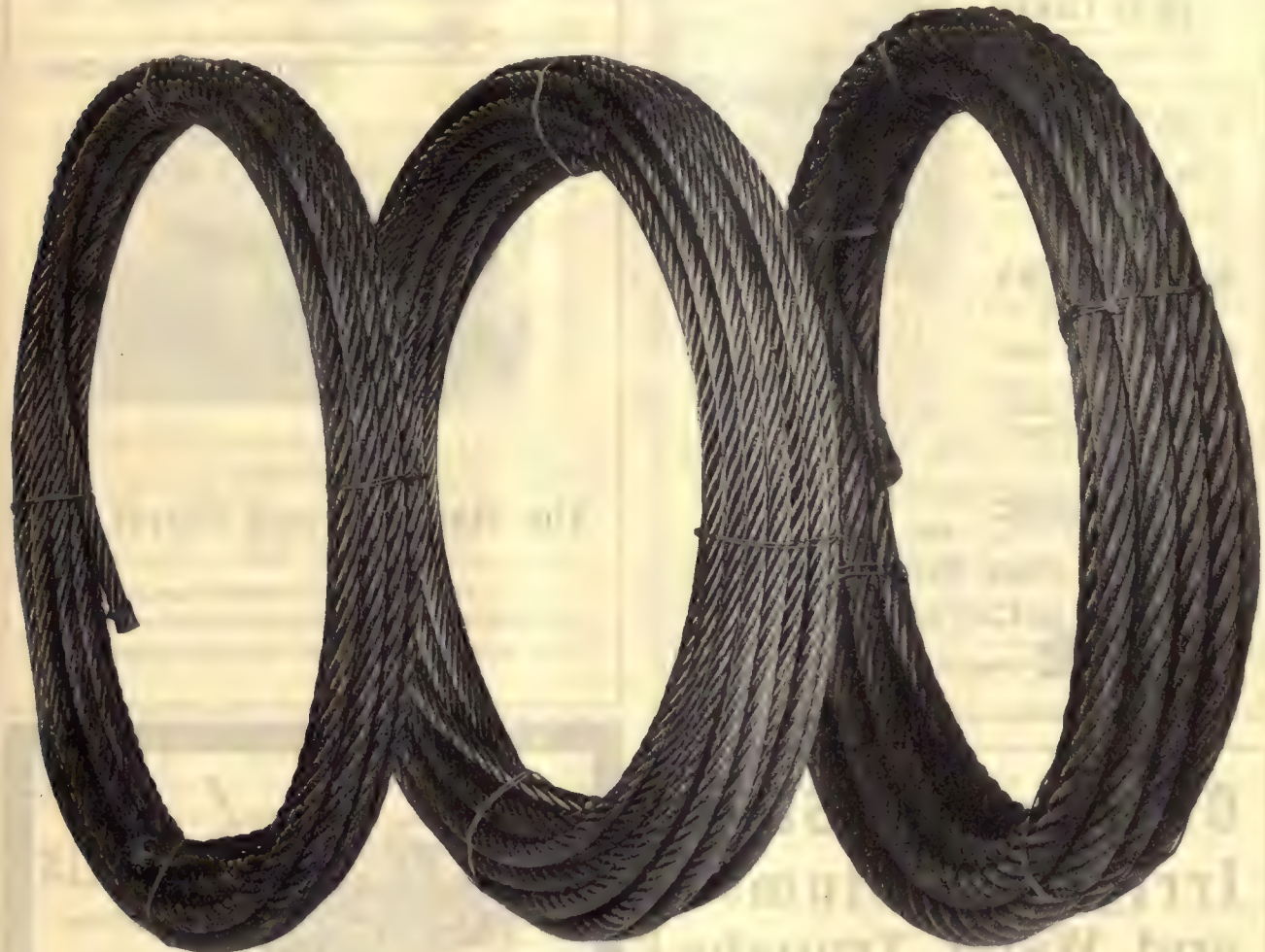
Here is a book of 500 pages filled with merchandise offered at Genuine "Wrecking Prices." Shall we mail you a copy?

CHICAGO HOUSE WRECKING CO.,

35th and Iron Streets CHICAGO

Sold direct or through our distributers.

Large stocks carried at convenient points all over the country, ready for quick delivery in either short or long lengths, on reels or in coils.



72 Feet
¾-in. Crucible Cast Steel
Hoisting Rope

202 Feet
¾-in. Monitor Dredge
Rope, 6 x 19

78 Feet
1-in. Plow Steel
Hoisting

American Dredge Rope

IN the great work of reclamation of the submerged lands of the Mississippi Valley there is no more active mechanical factor than our dredge rope. We make this rope with full knowledge gained from years of experience in the hard usage to which it is subjected, than which perhaps no other service can show an equal. There is not the same risk of life that goes with the operation of an elevator or a mine hoist, but there is greater wear, necessitating a very close study of the requisite quality of material and also experience in manufacture, to produce a flexible, reliable and durable dredge rope.

We offer our rope to dredgemen with assurance of the highest ***uniform*** quality and efficiency, as proven by the many years that it has now been successfully identified with this service.

American Steel & Wire Co.

Chicago New York Worcester
Denver San Francisco

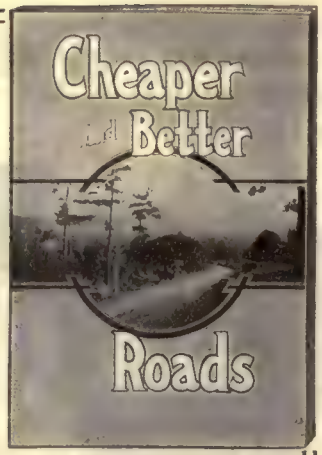
When writing to advertisers please mention The Irrigation Age.

NEW BOOK
For
Irrigation Farmers

YOUR name on a post-card gets it. Write now. It explains money-saving uses to which you can put our easy-to-handle, low-priced

20th CENTURY GRADER
For Cutting Sage Brush

for ditching drainage (shallow or deep), lateral making and cleaning, seed-bed and field leveling, borders, levees, road grading, etc. It is free.



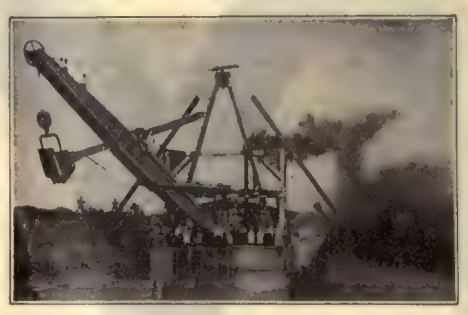
THIS is the front page of our brand new catalog referred to in this advertisement. The background is a rich orange. The half tone is in black and the letters are white bordered with black. It is 6x9, has 32 pages and profusely illustrated.

Described in full, Catalogue page 22 Attach it to tongue of grader

This Is Our Sage Brush Cutter

Address
BAKER MFG. CO.
726 Fisher Building
Chicago, Ill.

Ditching Dredges, Placer Mining and Traction Dredges
SUITABLE FOR ALL CLASSES OF WORK
Steam Shovels—All sizes
Ballast Unloaders



Write us for information, giving particulars of requirements

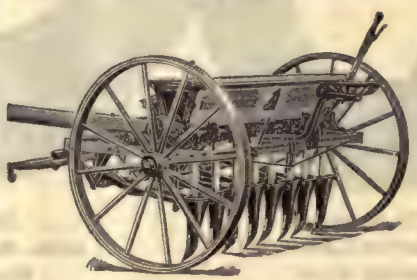
The Marion Steam Shovel Co.,
MARION, OHIO

G. W. BARNHART, Western Manager
718 Monadnock Building, San Francisco, Cal.
F. H. HOPKINS & CO., Montreal, Quebec

Galvanized Steel Irrigation Flumes and Water Troughs

For catalog and prices address

P. MAGINNIS
Home Office and Factory, KIMBALL, NEB.
—OR—
T. C. EGLESTON, 714 Ideal Bldg., Denver, Colo.

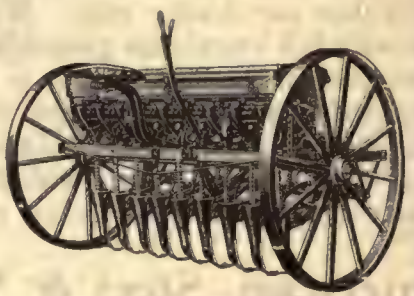


HOE DRILLS
Plain and Fertilizer

HOOSIER HOE DRILLS HAVE BEEN STANDARD FOR MORE THAN 50 YEARS
Made by
THE AMERICAN SEEDING MACHINE CO.
(Inc.)
RICHMOND, IND., U. S. A.

Supplied in all Styles and Sizes.

Grass Seed Attachments May Be Added.



THE IRRIGATION AGE

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THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION — THE DRAINAGE JOURNAL
THE IRRIGATION ERA — MID-WEST
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D. H. ANDERSON, Editor

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, $2.00. If ordered in connection with subscription, the price is $1.50.

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Official organ Federation of Tree Growing Clubs of America. D. H. Anderson, Secretary.

Official organ of the American Irrigation Federation. Office of the Secretary, 212 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 24 years old and is the pioneer publication of its class in the world.

Legal Department.

THE IRRIGATION AGE is preparing to start, in an early issue, a Legal Department upon the subject of Irrigation. This department will be edited by a well-known attorney who has made a life study of the subject, and will consist, First: Of a digest under the appropriate heads all the current cases upon Irrigation from Abandonment to Water Rights, dating from January 1st, 1908. Second: These cases will be so digested as to yearly amount to a complete digest of the Irrigation Law of the United States for the year, and at the expiration of each year it is our intention to publish same separately and in book form. So far as we know there are no irrigation reports, and from conversation with various attorneys who have studied the subject, they are greatly needed by the western farmer, and should be in good demand among lawyers throughout irrigated areas of the world. Our monthly article will not only be a digest, but a comment or brief on the cases referred to, and where a leading case is decided it is our intention to publish it in extenso.

These cases would all be taken from the report of the Supreme Court of all the western and irrigation states and from the United States Court for the western circuit.

It is hardly necessary for us to say that such a feature added to the matter contained in THE IRRIGATION AGE, brought out in a full and comprehensive manner, will be of inestimable value to our readers, whether irrigation farmers, promoters of irrigation projects or attorneys. We hope to have this matter so well along as to present the first article in our May number. It may possibly, however, not appear until a month later.

Alaska-Yukon Exposition.

The visitors and delegates at the National Irrigation Congress to be held at Spokane, Washington, August 9th to 14th of this year should arrange to visit the Alaska-Yukon Exposition, which will be in full swing during that month. The editor of THE IRRIGATION AGE visited the grounds in Seattle in March, and can assure its readers that they will find a well-equipped show housed in buildings equal in beauty to those of any former show of a similar character—in fact, the grounds are much superior to those of any exposition in past years, and the buildings are equal to those at the World's Columbian Exposition, Chicago.

Additional attractions are offered at Seattle, among them being the far-famed Alaska trip by boat.

Visitors from the central and eastern states will also have an opportunity of viewing mountain ranges and peaks rivaling the world's grandest scenery.

Our readers should remember that the cost of transportation is no more to Seattle than Spokane, and it would be well to purchase tickets from eastern points to Seattle over a northern line with stopover clause, thereby securing the privilege of a layover at various

points, including Spokane. The return ticket should read over some other than the line covered by the outgoing trip, which will enable the tourist to view a wider and more diversified stretch of country.

It would be well for prospective visitors at Spokane and Seattle to look up the matter of transportation, sleepers, etc., now, rather than to wait until the rush is on.

There is no finer mountain scenery than may be found on a trip through Colorado, Idaho, Montana, Washington, Oregon and California; all of these states may be included in the itinerary of a trip such as suggested above.

National Irrigation Congress.

The Seventeenth National Irrigation Congress, which is to be held in Spokane, Washington, August 9th to 14th, promises to be the largest affair of the kind that has ever taken place. The enterprising citizens of Spokane have secured sufficient funds, something in the neighborhood of $100,000, to properly exploit and entertain as many delegates as may attend the Congress. It is the impression of those well informed that there will be four and possibly five thousand accredited delegates at Spokane during the term of the Congress, and that the widespread interest in the subject of irrigation will attract from twenty-five to forty thousands additional visitors.

Attendance of central and eastern states people will mean much to Washington and the northwest generally.

THE IRRIGATION AGE is preparing an elaborate edition, which will appear as our May issue, fully describing the objects of the Congress, with one hundred or more illustrations of Washington and the northwest, particularly that territory tributary to Spokane. This issue will contain the official call of the Congress, with portraits of all of the officers, and in this issue will appear articles describing the various important projects throughout the west and northwest. Eighty pages of space will be devoted to illustrated and descriptive matter, and it is the intention of the publishers to make this the most elaborate work ever gotten out in connection with an Irrigation Congress.

The railways have agreed to make an especially low rate to Spokane at the time of the Congress, and the same rate will carry visitors to the Congress on to Seattle, where they may visit the Alaska-Yukon Exposition. The editor of THE IRRIGATION AGE visited the exposition grounds at Seattle recently and was much surprised to learn that the work is nearing completion and that the show will open in full force on the date set.

It is the impression of the Spokane people that this additional attraction at Seattle will add greatly to the attendance at the Irrigation Congress, as many eastern and central states people who are studying the subject of irrigation will be glad to take advantage of an opportunity to stop off at Spokane and study the matter, listen to addresses on irrigation and colonization, and then go on leisurely to Seattle, stopping here and there on the way, going and coming, to visit specific irrigation projects with a view to investment.

Our readers are especially requested to give the matter of this Congress consideration, and, if possible, plan to visit Spokane and Seattle during the month of August, when all crops are at their best, and where the results of irrigation may be fully explained and illustrated.

Any information concerning accommodations, which will be ample, and full data concerning the program and plan of entertainment, may be obtained by addressing the Board of Control, Seventeenth National Irrigation Congress, Spokane, Washington.

Northwestern Development.

Statistics compiled by the Spokane chamber of commerce show that 75 per cent of the newcomers into the northwest during the fiscal year ended February 28, 1909, turned to farming, stock raising and dairying, while of the others more than 50 per cent took up orcharding and chicken growing in districts tributary to the settled communities.

Of the thousands of visitors to the rooms of the chamber of commerce since January 1, 1908, the majority, including men and women from all walks of city life, came to the northwest to seek homes in the rural districts; not to become general farmers, but to take up some special phase of the work, and in the greater number of instances it is fruit growing.

The practice of intensive farming, more especially apple culture, has, in a measure, solved the problem of the American trait of the farmer seeking city life and the city man dreaming of rural happiness, and the nearness of the irrigated districts to the towns and cities in the northwest has served to satisfy both. Small tracts, electric railways, telephones, rural mail routes, make a combination of the best of city and country, and thousands are passing useful and busy lives in these districts.

There has been a tremendous movement to the northwest in the last fourteen months, when, according to the best information available, approximately 106,000 persons settled in Washington, Oregon, Idaho and Montana, and of these about 63,500 located in eastern Washington, northern Idaho, northeastern Oregon, western Montana and southeastern British Columbia. Thirty-five thousand settled in the Yakima, Wenatchee, Spokane, Walla Walla, Okanogan and Colville Valleys, the Palouse and Big Bend districts and in settlements opened by the Chicago, Milwaukee & Puget Sound and the Spokane, Portland & Seattle railroads.

Illinois, Iowa and Missouri furnished the majority

of these settlers, the rest coming from Nebraska, Indiana, Minnesota, Kansas, Pennsylvania, Ohio, Michigan, New York, West Virginia, Kentucky, Massachusetts, Vermont, Nevada and Maryland, with a sprinkling from southwestern states.

There was also a large influx of aliens into the northwest in 1908, when, with the exception of Minnesota, Missouri and California, Washington added more foreign population than any other state west of the Mississippi River. There were approximately 10,000 aliens, and of these Scandinavians were in the lead, with south Italians second, English third, Germans fourth and Finnish fifth.

The most important thing about immigration into Washington last year is that the greatest increase in numbers was of those who engage either in profesional or skilled occupations. Relatively to the great mass of immigrants, the number of foreigners of good class who declared Washington as their destination was larger than in any other state.

The number of laborers, so classed, who entered the state from foreign countries last year was 5,500 in round numbers. The number of farmers is exceptionally high, and shows, of course, the settlement of the rural districts by a thrifty class of people.

Grant Easier Conditions.

In recent information received from the Reclamation Service we note that the Secretary of the Interior has issued instructions to the General Land Office which removes a difficulty which has been encountered in connection with entries under the Reclamation Law. In information issued by the General Land Office in January, 1908, provision is made that after the requirements of the Homestead Law as to residence and cultivation have been complied with, the entryman or his heirs may make final proof of compliance with these requirements, when he will be relieved of the necessity of residing upon the land.

It is our impression that there is perhaps some mistake in the date, as if this ruling were made it would have been published prior to this time. We believe that in making copy for the press an error was made and it should have read January, 1909. This, however, is immaterial, in view of the fact that such a ruling has been made by the department, which leads us to believe that the Reclamation Service and the Interior Department are making an effort to make it more easy for the settler who takes up land under the Reclamation Law than was contemplated in the law itself. It is a well-known fact that all of the larger private irrigation projects which have been rapidly settled have realized that the government is sadly handicapped by some of the rules and regulations concerning the colonization of land under that law. In the first place, the settler has no available asset upon which to borrow under the Reclamation Law until he has proved up, no matter what his improvements or expenditure may have been upon the land. To make it clear, we will say that heretofore a man who has taken up land under the Reclamation Law has had to pay the usual 10 per cent annually, but has had no opportunity, no matter who improvements he may have put on his land, to use them as a borrowing asset, hence, the man who secured land under this system and had no ready money for improvements in the way of buildings, would find it necessary to go slowly and perhaps not get very far ahead before he had proved up. While, on the contrary, under private irrigation projects as soon as a man proves up under 30 days' residence, he has some standing with the banks and money lenders, and can borrow sufficient money to house his family and stock properly, and if he is the right sort of a man he can secure money to purchase implements and additional live stock, thereby placing himself in a position of independence within twelve or fifteen months.

We are glad to note the improvement in the plan of Federal development, but believe it will be necessary to go much further along this line before settlers will be willing or anxious to take up land under Government projects as against the inducements offered under private systems. It seems that this ever salient feature of development under Federal Control has been overlooked by the Interior Department and Reclamation Officials. They cannot expect to compete with live Carey Act institutions until they can offer equally as strong inducements. The claim is made, to be sure, that the Government project is superior to private work so far as stability and finish is concerned, but that has very little weight with the average settler, who is looking to make quick money returns from his labor and investment.

It is gratifying, however, to know that the Interior Department is willing to make concessions, and it is sincerely to be hoped that they may make further corrections and ask for some change in the law which will permit them to advertise their projects as extensively as is being done by private corporations.

Irrigation in China.

In reply to an inquiry from St. Louis respecting the opportunities in China for electrical pumps for domestic water supply, Vice-Consul C. L. L. Williams furnished the information that China presents a large field for irrigation, which is absolutely necessary, and which is now being done by hand over large areas in that country. The fact should be recognized that the superiority of pump over hand power must first be practically demonstrated to the Chinese, who from time immemorial have not altered this method, and do not readily take to foreign innovations of any character. As soon as these people are properly educated to the

use of pumps, manufacturers can decide as to the adaptability of their particular pumps where crops depend upon an artificial water supply, and it is our impression that a good market for pumps of all kinds is soon to be opened up in that country.

The suggestion from Mr. Gilbert, who prepared the information for Vice-Consul Williams, involves the installation of a sample plant, say on the Yellow River, in the northwestern part of Shantung Province, where they are now having a famine on account of drought. This simple plant should be put in at the manufacturer's expense and a nominal water tax could be charged, which, at the very least, would pay the running expense. It is possible, as suggested by Mr. Gilbert, that the Government could be induced to properly irrigate at a maximum cost, at so much per acre, with the understanding that proper reimbursement would be made upon fulfillment of certain conditions. The question of getting permission from the authorities to put in a plant, the manner of collecting the tax, and all other details could be solved by the local or traveling agent. The report sent in by Vice-Consul Williams contains a letter from the physician at the Methodist Episcopal Hospital at Peking, which deals with this pump question. The names of persons who might act as agents in this connection in China are on file in the Bureau of Manufactures at Washington.

The physician at the M. E. Hospital writes as follows:

"The well was bored in 1902; finished about December 1. It is 210 feet deep. There is no definite way of telling how much water is used. The capacity of the engine pump is 3,500 gallons per hour, when running at its capacity. We run the pump on an average of eight hours a day. We discarded a windmill simply because it could not do the work. There is no mill that could possibly keep us supplied. It would take an immense reservoir for reserve water, as the winds are too eccentric. A hot-air engine is in use. It is a fine machine. The sale of water pays all current expenses. Our well is in rather too secluded a place for the sale of much water, and then there are so many wells now that competition is rather large. By running pipes to another part of our compound we could sell much more water, I am sure. The sale of water, with the tax paid by our own people (missionaries), would pay for the plant in time. We have duplicated our engine this year and expect to pay for it from the sale of water. How long it will take to pay for the engine out of the water sales will depend entirely upon how well the water sells."

We would suggest that manufacturers who are contemplating the development of trade in China would do well to correspond not only with this physician at Peking, but with the proper authorities at Washington as well.

EDITORIAL NOTES.

BY G. L. SHUMWAY.

It remained for Congressman Tawney, chairman of the appropriations committee, to plow through the 381 pages of the "Homes Commission" report submitted by President Roosevelt to Congress as he surrendered his position, and to find the choicest bits of information that have ever been communicated to the august body of legislators, or benefited a farmer. Here are a few of the important items:

"Skimmed milk is the residue after the cream has been removed."

"Butter is formed by churning the cream of milk."

"Boots and shoes are intended to protect the feet from the uneven and rough surfaces of the ground, from cold, wet and heat——"

"It is a good plan to use night shirts and pajamas ——"

"Practical experience also teaches us that dreamless sleep is in every way recuperative, while a dreamful night produces a tired feeling in the morning; hence dreams should be avoided if possible."

The nerve-racking task of compiling such a valuable lot of information must have produced brain fag, or collapse, and I am sure that a year's recuperation in Africa, or some other seaport, would do them good. If they should happen to drown while there what a loss it would be to the scientific world. We can't imagine a more curious specimen for one engaged in psychological research than the brain of a man that will dish up such rot, and label it information.

When the last Congress appropriated $1,000,000 to ferret out land frauds it no doubt expected that the money would be spent in trying to return to the federal government a large acreage of land, but it seems that the first result was to put more immature Sherlocks upon the trail of home-makers. Let us hope that Mr. Ballinger will remedy this. There seems to be a portion of the affidavit of a homesteader to the effect that he does not possess 320 acres of land at the time of making entry. Now the juvenile sleuths are visiting the homesteaders who have not yet made proof, and if he finds one who has since acquired an acreage that exceeds 320 acres he is informed that his proof will be rejected.

Why are these millions wasted in such work? Why is it not used for the purposes for which it was appropriated? There are no doubt thousands of acres that have been illegally acquired from the government, but why do they not go after the large malefactors, and not send these pie-faced brats around bothering

people who are law-abiding, and want to put in their time improving their homes, and not "cussing" the government.

No one realizes more fully that there is little to be gained by scolding than the writer, but this condition needs correction, and I am of the opinion that if one could ever get beyond that barrier of bureaucrats there might be a chance of reformation. As heretofore, it is my purpose not only to point out the errors of administration, but to offer remedies. In this respect, I am of the opinion that very few, if any, of the recent entries of public lands contain fraud, but if you will go back ten, twenty or more years you may find more ample grounds for detective work. And do not pass up some of the biggest ones because they are personal or political friends.

Another suggestion to President Taft is that he select an envoy of unquestioned integrity to investigate and report direct the acreage of agricultural lands now held in forest reserves, which it is not intended to reforest, and that is suitable for home-making, and take measures which will restore this area to entry. I say this for the reason that there are, to my knowledge, several tracts which are suitable for irrigation, and the water supply is available, and people are ready to take hold if the government will let them.

It is not fair to settlement and development that the Reclamation Service and the Forest Service should have these projects withheld to force homeseekers to take up the projects developed by federal irrigation, for there are some things in the way of management of such projects that are, in our opinion, entitled to criticism.

We are presenting in this issue the first of a series of articles on Spraying, by Mr. E. H. Stiver. It is our intention to publish an article on Spraying in each of the forthcoming issues of THE IRRIGATION AGE for the year, which should prove both interesting and instructive to our readers.

Send $2.50 for The Irrigation Age one year and The Primer of Irrigation

POWER IRRIGATION

By E. C. REYBOLD, JR.

The Steam Pumping Plant of the Elgin Power and Water Company.

This plant was installed in the spring of 1907, and was designed to ultimately irrigate 1,000 acres of fruit land lying on the east side of the Green River in Utah, just to the north of the tracks of the Denver & Rio Grande Railroad (Rio Grande Western), about one hundred miles west of Grand Junction. The town of Elgin is situated at the intersection of the river with the railroad, and the town of Green River lies to the west one mile. None of this land had been irrigated before, but for many years previous there were some 500 acres of land of similar character planted to fruit trees just across the river, and splendid crops secured. It was therefore known that this sandy loam would produce first-class orchards if water were brought upon it, and the owners personally advanced the money for the installation of the plant and ditches. That they were right in their assumption is shown by the good stand of trees now growing upon the 350 acres that have been planted. After the plant was completed and everything in good running order an issue of bonds was made amounting to $16,000 and bearing 6 per cent. The proceeds of the sale of these bonds were used to reimburse the owners of the land for their original advances. These bonds are redeemable in eight equal installments, beginning in 1917, and are secured by not only the pumping plant, but also by the land that is irrigated.

The altitude of Elgin is the lowest upon the Rio Grande Railroad, being about 4,080 feet, and frosts are not frequent visitors. In the spring of 1907, when there was was very little fruit in either Colorado or Utah, this section suffered to some extent, but the frosts of 1908, which did great damage to many sections, scarcely touched the Elgin-Green River Valley. A number of the owners of this land had been raising fruits near Palisade, Colorado, for many years, and were perfectly familiar with the methods of planting practiced there. Knowing, also, that it would be poor economy to install a pumping plant that might not be perfectly reliable, they specified that everything must be first class. Coal was to be used for fuel, and as it was to cost as much as $4 per ton, it was essential that the efficiency of the whole plant be good. The original data upon which the plant was designed is as follows:

Fuel, coal, costing $2 to $4 per ton.

Land to be irrigated, 1,000 acres of sandy loam.

Quantity of water required, 10 cubic feet per second, or 4,500 gallons per minute.

Kind of water, frequently muddy during flood season.

Height of lift, 51 feet at low water (falling to 45 feet at high water).

Length of discharge pipe, 588 feet.

Length of suction pipe, 70 feet.

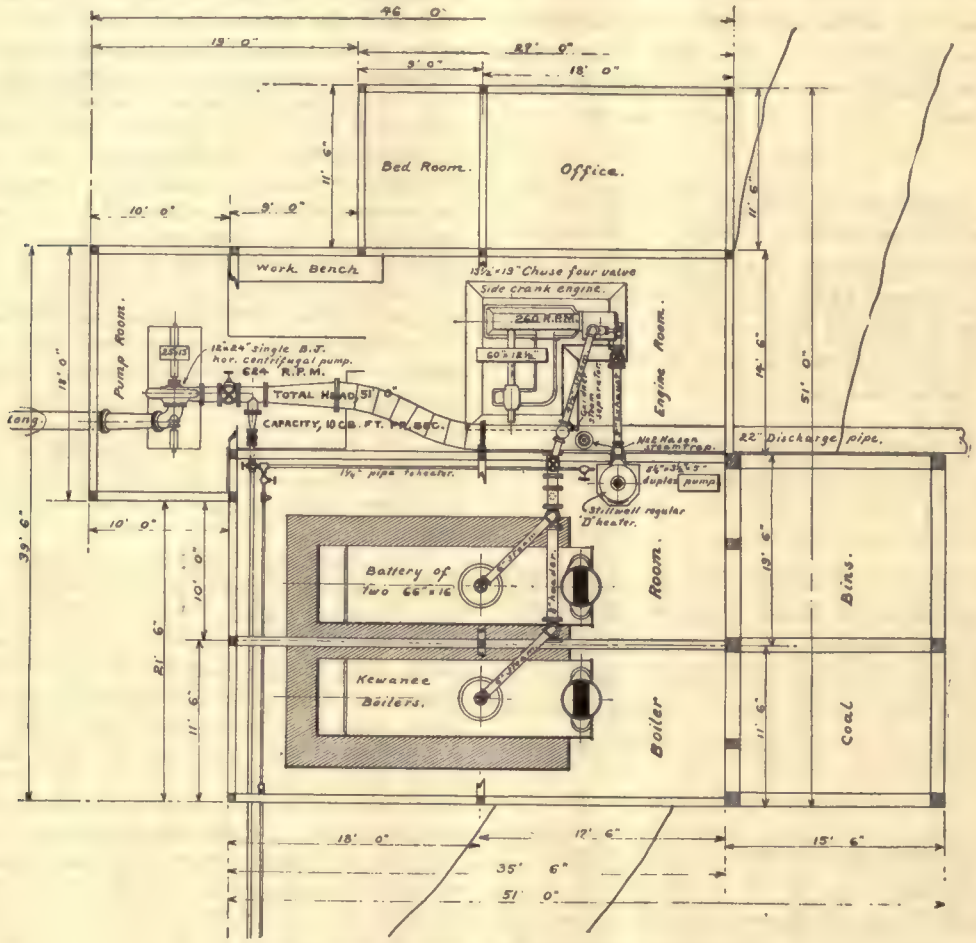
Feedwater for boilers, same as used for irrigating, frequently muddy, and often containing much mineral matter.

The equipment installed is as follows:

DISCHARGE PIPE AND SUCTION PIPE.

The discharge pipe is 588 feet in length, 12-gauge double rivetted steel, with slip joints being used, with an average diameter of 24 inches. In order that the cost of freight be lessened, the pipe was made of practically equal lengths of 22, 24 and 26 inches diameter, the two smaller sizes being nested for shipment inside of the largest. By Cox's formula the friction head in this pipe is found to be about 2 feet.

For the suction pipe, 70 feet of 14-inch, 12-gauge double rivetted steel is used, in which the friction head is about 1 foot. The total friction head is therefore 3 feet, and the maximum head against which the pump must operate 54 feet. A long suction pipe was occasioned by the necessity of reaching far out into the river when the water is low. A 15-inch foot valve is attached to the end of the suction pipe.



Vertical Section Through Engine Room of Elgin Plant.

PUMP.

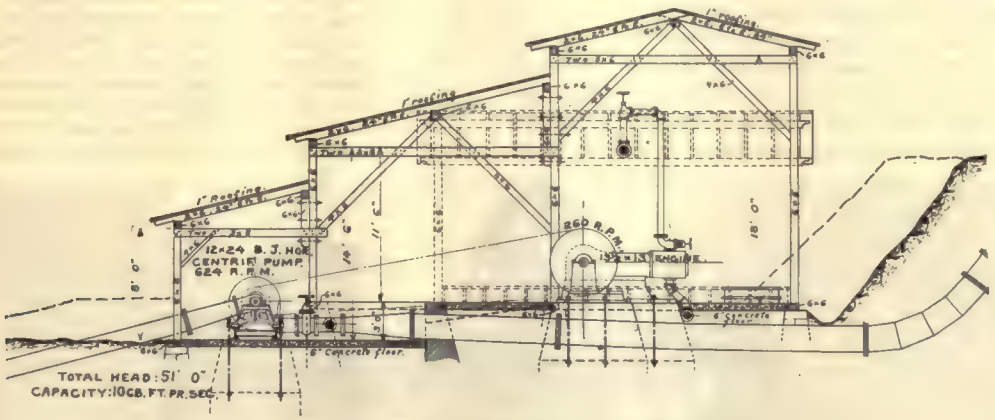
A Byron Jackson horizontal centrifugal pump is used, with an enclosed automatically balanced runner, the diameter of suction and discharge being 12 inches. In order that the silt and sand carried by the water might not be injurious, three outboard double ring-oiling bearings are used. It will be noted by the illustration of the pump that there is a bearing upon each side of the shell, the third being outside of the belt pulley. The two stuffing boxes are entirely separate from the bearings. The diameter of the runner is 24 inches, and the speed was fixed at 624 revolutions per minute, at which the capacity is 10 second-feet at 54-feet head. The discharge is horizontal and under, and size of pulley is 25x13.

A 12-inch gate valve is placed on the discharge side of the pump. The pump can be primed by means of the boiler feed pump, or a steam ejector, the suction of which is attached to the air vent on top of the centrifugal pump, and the gate valve closed. After the pump is full of water the engine is started, and after speed is attained the gate valve is opened. This method of priming is used only at the beginning of the season, or when the tanks are empty, as after the pump is running the water tanks may be filled by means of a valve and pipe system connecting with the main discharge pipe just beyond the gate valve, the same system serving to supply priming water when required. A third means of priming, and the one generally used, is by means of a 3-inch by-pass. Water from the discharge pipe, which is kept full when the pump is shut down over night by closing the large gate valve, is by-passed around the gate valve. This by-pass was installed in order to obviate the danger of bursting the pump by the heavy water hammer that might arise if it were primed by opening the main gate valve. Strict orders are given that the main valve must not be opened until the pump is full of water.

ENGINE.

The engine is a Chuse four-ported, self-oiling, high speed automatic, size 13½x13, with side crank. This

type of engine was selected on account of the small amount of floor space required; the low steam consumption, and the possibility of continuous operation with the minimum amount of attention. It is equipped with a belt pulley 60x12½ inches, the speed being 260 revolutions per minute. At this speed it will give 105 H. P. with 90 pounds steam pressure, and 117 H. P. with 100 pounds steam pressure. As the pump requires only 90 H. P., it is evident that the engine will operate well within its power with 90 pounds of steam. A 12-inch double leather belt is used to transmit the power to the pump.



Cross Section of Engine & Pumping Rooms.

Plan of Elgin, Utah, Plant.

BOILERS.

Two standard horizontal tubular boilers are used, each being 66 inches diameter and 16 feet in length, and rated at 100 H. P. A separate stack is used for each. Since bricks were scarce and high in price, the boilers were set in reinforced concrete, compensation for expansion being made in the design. This setting shows no signs of deterioration after two years' use. The boilers were designed for burning coal, but during 1908 wood was used very successfully, and no difficulty was experienced in operating the plant with one boiler.

AUXILIARIES.

Feed water is supplied to the boilers by a duplex boiler feed pump, piston packed, size 5¼x3½x5, capacity 40 gallons per minute.

In order that all mud might be settled out of the feed water before it is used, two wood tanks are used, 12 feet in diameter and 12 feet high, each being of ample capacity to contain sufficient water for feeding the boilers for 24 hours. The water, therefore, has 24 hours in which to settle before passing to the feed water heater and filter. Each tank is equipped with a system of flushing valves, by means of which all mud that accumulates may be flushed out before the tank is refilled by the centrifugal pump.

For heating the feed water before it passes to the feed pump, a Stilwell combined heater and filter of the open type is used. This filters the water first, and then permits it to pass in thin sheets over a series of pans, the exhaust steam from the engine being here brought into contact with it. Any mineral matter that is suspended in the water is here precipitated and collected, the pans being readily removed and cleaned. This combined system of purifying the water has proven so successful that no boiler troubles have been experienced in two years of pumping.

STEAM AND EXHAUST PIPES.

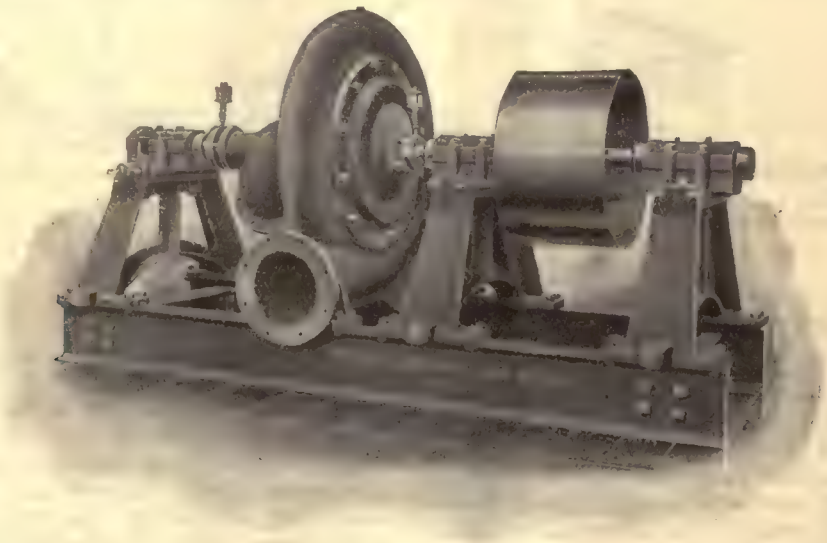
By carefully noting the vertical section and plan the methods used to compensate these pipes against expansion and contraction will be seen, and the general design of the plant comprehended.

COSTS OF PUMPING.

During 1908 the acreage irrigated was about 500 acres, 350 acres being planted to trees, 75 acres to cantaloupe, and about 75 acres to other crops. The pump was started on April 11th and ran until Sept. 16th, operating from 10 to 12 hours per day for 6 days per week. It ran for 140 days, or about 1,540 hours. The speed of the pump was kept down until it discharged about 7 second-feet, and the quantity of water pumped during this time was about 850 acre-feet, giving about 1.7 acre-feet per acre of land under cultivation. The secretary of the company writes that the plant, although designed for 1,000 acres, could sup-

Pumping Plant of Elgin Power and Water Co., Elgin, Utah.

ply water to 1,600 acres easily if operated 24 hours per day at full capacity. The fuel used during 1908 consisted of 200 cords of wood and 200 tons of coal, total cost being $1,000. For labor they employed one man for 5½ months, and another for six weeks, the total wages paid being $500. There were no interruptions on account of difficulties of any kind or repairs, and the boilers gave no trouble from bad water. The cost of supplies aggregated $100, and the total costs of operating for the year $1,600. Although only 500 acres of the total were irrigated, the costs of pumping are apportioned among the whole, making the cost $1.60 per acre. When the whole acreage is under water the fuel bill will probably aggregate $1,750, making the cost per acre for all expenses about $2.35. To this must be added the interest charge of 96 cents per acre, making a total cost of $3.31 per acre, or a sum considerably smaller than the interest and maintenance charge under many reservoir and ditch irrigation propositions. It will be noted that the system complete cost but $16 per acre.



Pump Used by Elgin Company.

The designs and plans of this plant were made by the Irrigation Engineering Department of The Hendrie & Bolthoff Manufacturing & Supply Company of Denver. The complete equipment was furnished by the same firm, and the erection carried on under the supervision of their representative.

NOTES ON POWER IRRIGATION.

The Antlers Orchard Development Company of Colorado Springs, Colorado, is getting bids for a 900 H. P. water power pumping plant for Silt, Colorado. Water is to be pumped over 300 feet high.

The Northern Colorado Power Company reports that it has made a number of contracts for electric pumping plants.

A steam pumping plant is to be installed upon the Orchard Home property at Green River, Utah, contract having been let for the equipment.

The Palisade Irrigation District has overhauled their plant and is ready for work. A new 20-inch pump and water wheel have been installed.

CIVIL AND IRRIGATION ENGINEERING.

Carpenters' Work in Colorado.

The annual returns from the irrigated lands of Colorado are double those from her mines. This development of what was a desert until irrigated, has been fostered in every step by the Civil and Irrigation Engineering Department of the Colorado Agricultural College, of which for over twenty years, Prof. L. G. Carpenter has been the head.

In this department there are at present four assistants and the force is carrying on work both for the state and for the students.

Professor Carpenter's first important work was the measurement of the water supplied by the streams and the artesian wells of the state, particularly the Cache la Poudre, the Arkansas and the Rio Grande. The data obtained have been in constant use by state engineers and by the courts in adjusting filings and claims for water.

The first careful and exhaustive investigation of the duty of water was made by Professor Carpenter and his force, and was a strong factor in largely increasing the acreage irrigated by the available water supply.

Professor Carpenter was one of the first to urge the storage of Colorado flood waters in reservoirs. Eight billion cubic feet of water are annually stored in reservoirs in northern Colorado, and twice the area of land is irrigated that would be possible if irrigation were made directly from the streams only.

The flow of water from the artesian wells of the state was studied for two years and the data published by the United States Department of Agriculture.

The volume of seepage water and its value for irrigation were brought out through careful investigations by this department and today tens of thousands of acres are irrigated in Colorado with this water and the area is constantly increasing.

An exhaustive investigation was made of the underflow waters of the state.

Satisfactory methods for the exchange of water between irrigation systems were worked out by this department and are in general use.

The trapezoidal weirs used in Colorado were introduced upon the recommendation of Professor Carpenter.

Improvements in canal, ditch and reservoir construction and management have been introduced throughout the state through the investigations of this department.

Many capitalists will not invest in irrigation projects unless Professor Carpenter has inspected the territory and approved the plans. His endorsement has brought millions of dollars to Colorado to be used for irrigation construction. For one project $3,000.000 was furnished on

condition that he endorse the plan; there are several irrigation systems where for each a million dollars or more has been expended because the plans were approved by Professor Carpenter; and many others constructed on his approval where the cost was $500,000 and upward.

Kansas brought suit against Colorado to stop the use in the latter state of the waters of the Arkansas river, demanding the uninterrupted flow of these waters into and through Kansas.

Ten thousand pages of evidence were submitted to the United States supreme court, and Colorado won after an intense contest. The attorneys on both sides conceded that the case was won solely through the mass of facts on irrigation presented by Professor Carpenter and that without his evidence Colorado would have lost.

Had Colorado lost this suit, irrigation would have ceased in the State along the Arkansas and an area of highly productive land, equal in extent to all the improved land of New England, would again have become a desert. If Kansas had won, other states were planning to stop the use in Colorado for irrigation of the waters of the Platte, Rio Grande and Grand rivers.

The government of British Columbia asked Professor Carpenter to prepare a code of laws for that country to govern all matters relating to irrigation and the appropriation of water, and this code became the law of that country. The French government decorated him for work in irrigation and irrigation engineering.

The equipment of the Department is valued at $14,414, and it cost $18,995 to operate the department for the two years ending November 30, 1908. The enrollment in all classes for the year ending March 1, 1909, was 614.

The Colorado Agricultural College started the first school in America in Irrigation Engineering and has been sending out graduates from this department since 1892. These graduates have been leaders in the engineering world and many of them have done important work on the irrigation systems of the state and have been and are today one of the strongest factors in developing Colorado agriculture.

Several civil and irrigation engineers who have graduated from this school have each had charge of constructing irrigation systems that have brought more capital to the state than the entire cost of the College from its beginning to date.

$2.50 Will pay for the IRRIGATION AGE one year and the PRIMER OF IRRIGATION.

SPRAYING IN GENERAL.

BY H. E. STIVER.

The subject of spraying has not heretofore sufficiently engaged the attention of the fruit men of the west, but, we are glad to say, they are commencing to realize the great value of it, and a goodly number of our prominent growers are using the pump and mixtures as a stepping stone to greater crops—better crops—and bigger profits.

This initial article is not intended as a treatise on the technical side of spraying, but rather to show the great possibilities which spraying presents, and to get sufficient interest awakened to see if future articles are desired by our readers.

Stating it in the popular term of the day, "Spraying is no cinch," as it requires careful planning and plenty of elbow grease in case anything smaller than a power outfit is used, but the writer of this has yet to find an occupation where the same proportion of remunerative results is gained, without a plentiful supply of work.

Irrigating an Orchard in the Pecos Valley, New Mexico.

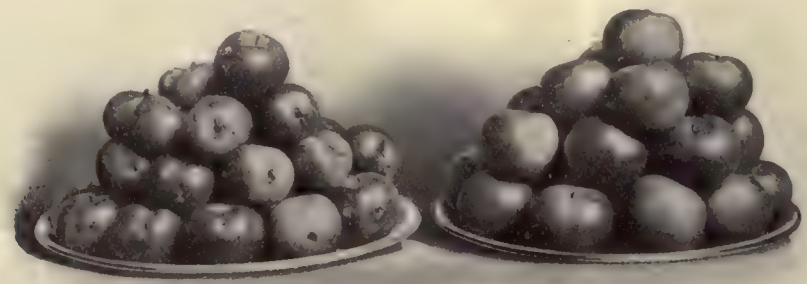
The fundamental object of spraying is to both rid and prevent the invasion of orchards, etc., by fungus or vegetable parasitic growths, and by insect invasion, these two main divisions of fruit enemies being classified as fungus and insect, and their respective preventatives and cures are known as fungicides and insecticides.

Nearly everyone is familiar with the action of the common tapeworm, which takes the strength giving parts of one's food—the part that should be used in building up a strong body—and appropriates this for its own use. Constantly repeated, this operation invariably results in the loss of flesh and vitality, with a consequent weakness. As the worm grows larger it demands more food. At the same time the body tissues are crying for their nourishment, which is being used up by the parasite, and the intellectual and physical strength of the man is in grave danger, as the soundest mind must necessarily require first a sound body to draw from.

It is in this same way that the insects and fungi have their effect upon the tree or plant. They cut, bore, split and suck in their endeavor to obtain a living, but to the great detriment of the trees and plants. Consequently the fruit from such a tree is bound to be stunted, tasteless and nearly worthless.

Again, we have a class of destroyers, in which are included the codlin moth, curculio, and the like, which prey directly upon the flower and fruit of the tree and pay comparatively little attention to the bark of the tree itself. Here we have the mutilated and wormy apples, which either rot on the trees or drop to the ground and decay.

A very close inspection of a tree is necessary to discover the first arrivals, also a careful discrimination is necessary to accurately recognize the character of the plague. But if you discover the kind of pest that is entrenched in one tree in your orchard, generally the same destroyers are inhabiting the trees of the entire orchard. In fighting this invasion, remember that you are not doing it alone. Your State Experiment Station wants to send you Bulletins—they want to give you practical instructions, the result of their exhaustive experiments. These Stations are doing grand work in the suppression of the fruit killers, and if you will cooperate with them they can save you a lot of experimenting for yourself.



Sprayed and Unsprayed Fruit.

All the exhibits of apples at the National Apple Show at Spokane, Wash., last December were sprayed apples. Some of them were non-irrigated, but all were sprayed. This fruit was the occasion for many exclamations of delight from enthusiastic fruit men on account of its symmetry, beauty and taste, and many a skeptic who did not believe in spraying was speedily converted into a spraying crank after a visit to the Spokane show.

Commission men, who buy in great quantities, generally ask if the fruit has been sprayed, and some of them will not even look at unsprayed fruit. Perhaps you have had an experience of your own on this subject. But it is not simply because they want the sprayed fruit. There is more behind the subject than that. There is the great general public which wants good fruit, demands good fruit and will have nothing but good fruit, even if it has to pay more for it. And here is where the profits of the fruit grower commence. He has a steady market, demanding more than he can hope to produce, with every year seeing a new demand bigger than ever. Still some of our growers refuse to spray because an outfit "costs too much." As a rather peculiar coincidence, there appears in other pages of this magazine a large ad from a prominent spray pump concern which goes very fully into the subject of cost and result, and we refer you to this ad, without any degree of partiality on our part, simply to allow you to read something which we do not wish to repeat right here.

Heretofore fruit growing has been rather easy for us of the great southwest, but the immense shipments of new nursey stock and other reasons have caused our virgin trees to become infested with these pests, which, the sooner we start to destroy, the sooner we will rid ourselves of them. We must do this before they make such a determined stand that we cannot eliminate them, and have to stand by and see our great fruit districts wiped from the map simply because we failed to spray in time. Future fruit growing will not simply be a process of planting the tree and picking the fruit, without any other attention whatever. The fruit grower of the very near future will have to follow scientific methods if he expects to get marketable fruit, and chief among these methods will be the problem of spraying, which, when carefully looked into, becomes a surprisingly easy problem if a careful system is followed. But it will be a case of competition between the insects and the growers, and the sooner the magic line is drawn so the insects cannot enter, the sooner you will find that less work is necessary to keep them out, and then—and perhaps then only—will the great value of spraying be brought home to you in a most forcible manner—because it applied to yourself.

WEISER—IDAHO.

Winter has gone and the Weiser country has had its usual mild and pleasant winter; the coldest weather has been 5 degrees above zero, and there have been no severe storms or blizzards, as these are unknown.

And now it is pleasing for the people of Weiser to note the progress of industry and the many things that promise much for the development of our many resources and to add greatly to our wealth and population. Without a doubt this will be the most prosperous year ever known in this section.

The Idaho-Oregon Light and Power Company has

completed its lines to Weiser and we are now to have one of the best and cheapest light and water systems of any town in the West. The coming of this electric power means much in the way of industries, as there is an abundance of power that will be used by manufacturing plants, and also for the pumping of water for irrigation to the lands that are higher than the gravity ditches.

Another matter of great importance to this section is the Malheur Government Irrigation Project. Work will soon begin upon a great irrigation system which will irrigate 200,000 acres of the finest land. Lands that are suitable for general farming and fruit and will support a population of many thousands of people.

For any additional information concerning the Weiser country address the Secretary of the Weiser Commercial Club, Weiser, Ida.

TROUBLESOME SAGEBRUSH.

Destroying sagebrush is a tough problem for the newcomer into irrigation districts.

Much interest has been aroused in the various parts of the west about the appearance of a new attachment which can be used for cutting off the sagebrush about four inches below the surface.

The cut we are showing will be readily understood with a little explanation. It consists of three parts. Two steel blades and an upright. The latter is tough spring steel, one-half inch thick, five inches wide and thirty inches high. The front edge is sharp. Two keen-edged blades or knives are bolted to the bottom. These extend right and left like wings at a sharp angle, and are thirty inches long.

This attachment is tied to the pole of the 20th Century Grader, a machine which is now very popular in the irrigation districts for cutting and cleaning laterals, and making shallow ditches. Also for land leveling, border making, road grading, seed bed making, etc.

People who have seen this attachment say it is just the thing. "Now we can grade, level, ditch and cut sagebrush with this one machine."

The Baker Mfg. Company, 726 Fisher Building, Chicago, Ill., are sending out a brand new catalog full of pictures, showing ditching scenes, giving articles on farm drainage and irrigation work, and excellent articles on road grading, etc. This catalog is free, and will be sent promptly to any inquirer.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

GARDEN CITY KANSAS and VICINITY

BY R. H. FAXON.

Springcoming in Western Kansas always means a good deal, but it is probable that it never meant quite so much as it does this year. In all the time that this great Western Kansas country has been developing and regenerating and growing in an orderly, systematic, intelligent and scientific way, once again, after the years of crudeness and carelessness of nearly a generation ago, there has never been quite the degree of hope and certainty ahead of it as now.

The new order of things applies peculiarly to the section of which Garden City is the capital. The word capital is used advisedly. There is, as this writer has heretofore pointed out in these columns, a scope of Western Kansas territory that is abundantly resourceful, that is growing with a steady and certain speed, that has a future which may be counted upon, and that will witness the real expansion in the lower Arkansas Valley in the next few years—and of that domain is Garden City the real capital. It is a little kingdom of its own, this lower valley country, and the alfalfa and the sugar beet, with the kindred and allied products, to say nothing of ordinary agricultural crops, make the country indeed wonderful, which enhances the town and the very contiguous territory that are the subject of these remarks.

There has been much water in the Arkansas River during the winter season. For the first time in the history of the Garden City region there was systematic attempt made looking to winter irrigation. Concerted action was taken. It was due, perhaps, to three factors worth mentioning: The activity of the sugar factory people, especially the general manager and the manager of the land department; the persistent and untiring efforts of a representative of the United States Department of Agriculture, who held meetings all over this western country, and whose headquarters was Garden City; and the fact that the leading newspaper of this Western Kansas region of which Garden City is the capital has conducted a campaign equally persistent and unremitting. The abundance of water, the fact that the season permitted such work, and the presence of so many canals in the Garden City territory, made the first real trial of winter irrigation a success. Thus the 25,000 acres and more of land adjoining Garden City and available under the different projects for irrigation go into use this spring well soaked and in a fair way to produce enhanced crops and with the necessity for less water during the drier season, when there may not be so much water. It is probable that never again will the Garden City country do without the fullest winter irrigation.

Thus, as a start, is the ground well prepared for the season's work. Not only that, but the acreage of irrigable land is increased. Under the Garden City reclamation project of the government there is approximately 10,000 acres available. Under the new pumping plant of the United States Sugar and Land Company, owning and operating the sugar factory, is an acreage of something more than 5,000. Under Lake McKinnie

and its canals—this lake is the large reservoir conserving the winter's supply of river water and utilizing it in the summer season—is as large a territory as that under the reclamation project. Lake McKinnie is owned by the sugar company.

Hence there is a large acreage under water conditions that are certain. Besides this, there are the many private plants, and the great utilization by small owners of the underflow and shallow water by means of raise with small gasoline engines. Never before was there such an outlook before the Garden City country as the spring season opens up. The land well soaked, the acreage increased, mean better crops and more crops.

The sugar company is about to complete its pumping plant adjacent to Garden City. This is nearly a replica of the government project. The groups of stations, the number of wells, the general arrangements, with the central plant and transmission line, is very similar to the government project. Work was commenced last summer, and the one thought was to make it perfect, but to insure its readiness for work when this spring's season began. The sugar company expects great results in the remarkably fertile country to be watered by this plant. Not only this, but the sugar company has made extensive alterations and strengthening of its reservoir, Lake McKinnie.

Allied closely in this Garden City section with irrigation is dry farming. Experiments along this line have been conducted successfully here for some years. The government and the state own and operate jointly at Garden City an experimental station that is doing good work. The state has not been as careful and as lavish in its aid as the government, but the indication is this defect will be cured this season. The farm is well equipped, and the demonstration work that has been done has resulted in much enlightenment to farmers. Nor only this, but farmers who have seen have gone forth and put into successful operation the ideas they have gathered at the station. The result is that where farmers were unable, for one reason or another, to irrigate, they have tilled the soil so as best to conserve the natural moisture, and some of the crop reports by such intelligent farmers have been wonderful to relate. As one direct result of such application, the increase in potato raising has been marked. This section is not nearly so dependent upon Colorado as formerly for this much-demanded product.

Two subjects have been much agitated in Kansas, particularly in Western Kansas, for the past year: Forestry and good roads. Both have been the subjects of discussion and campaigns in politics, one party, the dominant one, having included them in its platform in the state last year, and its candidate for governor having called on the legislature for help in his biennial message. The newspapers, especially a small group, and one or two strong ones in Western Kansas, are entitled to credit for starting this campaign. The result is not wholly what is demanded, but is by way of encouragement to those who have conducted the campaign. Excellent good roads laws were passed by the legislature just adjourned, permitting, for the drier Western Kansas, systematic road work on dirt roads, and country and township campaigns under road officers. The forestry law was not a comprehensive one, but directed more serious and intelligent attention to the subject than ever before.

It was only natural that Garden City and vicinity should be leaders in both forestry and good roads movements. The headquarters of the Kansas national forest are at Garden City, and the town is alive to the work of afforestation the government is doing in Western Kansas. This has been so marked and the success has been so great that it gives abundant incentive to private enterprise. The result is that there has been more private planting of forest, shade and use trees in Western Kansas than perhaps elsewhere in the country. No small home is now complete without its trees. Garden City is a veritable forest, and this has led smaller adjacent towns to emulate its example. Commercial tree planting has also become a factor in Western Kansas.

As to good roads, one of the first endeavors along this line in Western Kansas was at Garden City, where seven miles of good road through the sandhills country to the south will be completed this spring. The formation is of gypsum-clay, making a splendid road, and only needing the application of crude oil within a year or so to make them permanent. This opens up to Garden City a trade territory naturally its own, but rapidly decreasing on account of impassable and imposible roads when the campaign was begun.

There is one marked factor in connection with these two movements and the use of water by private persons in a small way that is worthy of note and is the forerunner of what must necessarily occur in the country at large sooner or later: The fact of self-dependence. The conservation movement, now well grounded in the country, cannot and should not depend entirely upon governmental or state aid. If it does, it cannot succeed, for, powerful as the government is, it cannot support the burdens of all the states, however worthy. This fact is nowhere better recognized than in Western Kansas and at Garden City. It is, in its small and humble way, endeavoring to set an example to the country in self-dependence, and mark an about-face on the part of the people in their abandonment of what they and their state can themselves do by seeking more aid from the general government than is proper or than the government can justly give. Further than that, the Garden City spirit is typifying the necessary change in the great political policy that, while a great centralized government is a great thing, it may become, through inactivity of state and citizen, so top-heavy, so unwieldy, that it may be crushed of sheer weight of burdens assumed. In the opinion of this writer the spirit of Garden City in respect of its humble and little labor, is, after all, the greatest achievement a people or a community can do at this stage of the times.

So the outlook for the year 1909 in the Garden City vicinity is not only hopeful, but, more than that, is cheerful in the extreme. The wonderful country that nature gave it; the aid it has received from the general government; the enterprise of its good citizens and of outside capital; the cohesiveness of spirit and of progression shown, and its work along the line of self-dependence and self-reliance are such that there is no question about the position it has attained in the procession.

Send $2.50 for The Irrigation Age 1 year, and the Primer of Irrigation

CORRESPONDENCE

Fairview, Mont., March 20th, 1909.

Editor Irrigation Age, Chicago, Ill.:

Dear Sir—I am a water user under the Lower Yellowstone Irrigation Project, and desire some information and advice relative to the construction and interpretation of the "Reclamation Act." I thought you might be able to quote me some authority on the interpretation of certain provisions of the law and give me some advice as to the best way for the water users to proceed to get justice.

I believe the "Reclamation Act" has been violated in many of its most important provisions. The provisions in section 4 of the act relative to the time when public notice shall be given as to the "area per entry" and "the number of installments in which said charges shall be paid" and the cost of construction we believe have been violated. Under this project it was about four years after the Secretary of the Interior decided that the project was practicable and contracts let for construction that public notice was given as required by section 4. This association was organized on the basis of $30 per acre, it being understood that that was the estimated cost, and a limit beyond which the government could not go in the cost of construction, yet the public notice issued by the secretary fixes the charges at $42.50 per acre, to be paid in ten annual installments, and a maintenance fee of $1 per acre for the first year.

We cannot understand how we can be mistaken or wrong in our conclusions on these most important points. The language of the act is precise as to what the cost shall be. It says estimated cost, and in no place mentions actual cost. The law also provides in section 3 that the maps, plans and estimates of cost shall be complete, and in section 2 that these facts and estimates of cost shall be filed with Congress at the beginning of every regular session. In the Third Annual Report of the Reclamation Service, page 31, F. H. Newell, director of the Reclamation Service, refers to this provision as follows: "One of the most important provisions of the law is contained in this section (section 4), namely, that requiring these payments of the estimated cost of construction. This is an effective safeguard against undertaking visionary and unprofitable operations, and puts the operation under the law on a sound basis." We believed at the time of the organization of this association that that was the meaning and true interpretation of the law, and with that understanding authorized our president and secretary of the water users' association to sign the contract for the construction of the canal with the Secretary of the Interior.

This association was also organized as a 160-acre farm unit project, and the entrymen after working for four years, on the advice of the Reclamation Service, to prepare their lands for irrigation are notified by the decision of the secretary that 80 acres of their land, and, in many cases, much of their labor for four years will be taken away from them.

Are we right or wrong on these questions? We want to live up to our contract with the government, even though it imposes on us greater obligations than we were at first led to believe by those whom we thought were our benefactors. If we are right we propose to stand for the principle that right is right. In our own minds we have reached the firm conclusion that we are right, but we are open for conversion. However, we want more substantial arguments than, "I can't read it that way."

The following are the questions on which this water users' association and the Reclamation service do not agree, to wit:

1st. Shall the secretary report to Congress the estimated cost of contemplated work before contracts for construction work are let?

2nd. Shall the plans, maps and estimated costs of contemplated work be complete before he determines whether the project is practicable?

3rd. Shall the secretary give public notice as soon as contracts are let for construction, and thereby determine the area per entry and charges per acre?

4th. Is the estimated cost the sum to be returned to the reclamation fund?

5th. Does the estimated cost include maintenance and operation charges for ten years?

6th. Have other projects had any trouble on these questions?

I have given a brief discussion of some of these questions from the viewpoint of the water user, to give you some idea of the grounds on which we take issue with the government, but we would like to know how people who are not financially interested interpret these points of law, and the justice or injustice of straining or violating the law or all concerned.

Why did the secretary wait for four years before giving public notice? Is there something about the estimated cost and the actual cost that the secretary did not want made public?

I have asked you too many question now, but these questions are of so much importance to the water users of this valley that I could not restrain myself from asking them, and trust that you will answer those that you think of enough importance to answer.

There are other questions that I should like to ask later on, but we want to get straight on these questions first.

Thanking you in advance for such information as you may give me in these matters, I am

Yours truly,

MONTANA.

[This letter, signed by a prominent citizen of Montana is printed in full, so that others of our readers who have encountered similar conditions may send a statement of their experience to us, to be forwarded to our Montana correspondent. Such conditions may only be corrected by strong protest from the many.—EDITOR.]

The Secretary of the Interior has restored to the public domain the following described lands, which were withdrawn in connection with the Rio Grande irrigation project, Texas-New Mexico: New Mexico. New Mexico Principal Meridian. (International Reservoir Site)—Township 26 S., R. 2 E., all Secs. 3, 4, 9, 10, 13 to 16 inclusive; 21 to 28 inclusive, and 33 to 36 inclusive; township 27 S., R. 2 E., all Secs. 1 to 4 inclusive, 9 to 16 inclusive, 21 to 28 inclusive, and 33 to 36 inclusive; township 28 S., R. 2 E., all Secs. 1 to 4 inclusive, 9 to 16 inclusive, 21 to 28 inclusive, and 33 to 36 inclusive; township 29, S., R. 2 and 3 E., all Secs. 1 to 4 inclusive, 9 to 16 inclusive, 3 to 11 inclusive, and 13 to 18 inclusive.

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Supreme Court Decisions

Irrigation Cases

TEMPORARY STORAGE OF WATER.—

Priority of water for storage purposes cannot be secured by a temporary storing of water for immediate irrigation in temporary receptacles, forming part of a continuous conduit for carrying water from the stream directly to irrigate lands.—*Windsor Reservoir & Canal Co.* v. *Lake Supply Ditch Co.* Supreme Court of Colorado. 98 Pacific 729.

REVOCATION OF PAROL LICENSE.—

Where defendant granted plaintiff's assignors a parol license to construct an irrigation canal over defendant's land, and plaintiff's assignors entered and expended a large sum of money in the construction of the canal, a license to maintain it was irrevocable.—*Miller & Lux* v. *Kern County Land Co.* Supreme Court of California. 99 Pacific 179.

SOURCE OF WATER.—

With the limitation that the use of water for irrigation, so far as it affects the rights of others similarly situated, must be reasonable, the riparian right to use water on adjoining land for irrigation applies as well to the water of a lake, pond or slough as to a flowing stream.—*Turner* v. *James Canal Co.* Supreme Court of California. 99 Pacific 520.

VENDOR'S LIABILITY FOR DIVERSION.—

The original owner of land for which water was appropriated is not liable to a purchaser of one of the tracts into which the land was divided for subsequent acts of third persons in diverting water from the ditch, nor for wrongful diversion of water by his lessee while such owners was not in possession.—*Booth* v. *Trager.* Supreme Court of Colorado. 99 Pacific 60.

REVOCATION OF LICENSE.—

Where plaintiff attempted to appropriate water on the land of another without grant, condemnation proceedings or prescription, the right acquired amounted to a license without consideration or coupled with an interest, which was revocable at the pleasure of the licensor or his successor, and was revoked by the latter's obstruction of the flow.—*Prentice* v. *McKay.* Supreme Court of Montana. 98 Pacific 1081.

ESTABLISHED RATES FOR IRRIGATION.—

Under the provision of act March 12, 1885 (St. 1885, p. 95, c. 115), that the use of all water appropriated for sale, rental or distribution in the state shall be a public use, a company furnishing appropriated water for irrigation purposes has only the constitutional right that its property shall not be taken for public use without just compensation, viz., a fair return on the reasonable value of the property at the time it is being use for the public benefit.—*San Joaquin & Kings River Canal & Irrigation Co.* v. *Stanislaus County.*—Supreme Court of California. 99 Pacific 365.

SUBDIVISION OF LAND.—

Where land for which a specified amount of water had been appropriated was divided into small tracts, in the absence of a contrary showing, and where the original owner and a purchaser of a tract recognized that each owner owned his proportionate share of the water, for the purpose of an action by such purchaser against the original owner for diverting water, it will be assumed that such purchaser owns the proportion of the water awarded to the entire tract that his tract bears to the entire tract.—*Booth* v. *Trager.* Supreme Court of Colorado. 99 Pacific 60.

DELAY IN DELIVERY OF ENGINE FOR IRRIGATION.—

Where a seller, contracting to construct and deliver an engine for irrigating work, delayed the delivery thereof but it appeared that the engine, which was delivered before a pump subsequently contracted for was delivered was useless without the pump and the seller built the pump according to a model furnished by the buyer, the delay in the delivery of the engine, on which alone plaintiff relied, did not cause any damage to the buyer, especially when the pump furnished was incapable of doing the work for which it was designed.—*Hendry* v. *Irvine.* Court of Appeal, First District, California. 99 Pacific 408.

ARTIFICIAL CHANNELS.—

After high water channels are artificially opened, and after they, together with the cuts dug connecting them with the main stream, have been used by the parties opening them and by their successors in interest, and such use is acquiesced in and recognized as branches of the main creek by others on the main stream and its tributaries and branches, for the period prescribed by the statute of limitations, they become natural channels, and owners of lands adjacent thereto are in law entitled to the same consideration and to the same rights as are those of the main and unquestioned channel.—*Hough* v. *Porter.* Supreme Court of Oregon. 98 Pacific 1083.

RIPARIAN RIGHTS.—

During the winter and spring months, on account of rainfalls and the melting snows in the watershed of a stream, it carried a large volume of water, which at all stages flowed in a continuous body, though the channel of the stream and its branches were overflowed so that the water spread over adjacent land. The overflow might be anticipated in every season of ordinary rainfall, and failed to occur only in seasons of drouth. *Held,* that the waters constituted but a single water course, and riparian rights pertained to the whole therof.—*Miller & Lux* v. *Madera Canal & Irrigation Co.* Supreme Court of California. 99 Pacific 502.

PAROL DITCH LICENSE.—

Where a complaint for violation of plaintiff's right to maintain an irrigation ditch on defendant's land, after pleading a written agreement conferring on plaintiff's predecessors such right of way, alleged that defendant's agents co-operated in laying out the lines and locating a canal to conduct the water over defendant's land, and that plaintiff's ditch was constructed openly, with defendant's knowledge, and that defendant's officers encouraged the construction, such facts warranted an inference that plaintiff relied on a parol license to maintain the canal, and did not intend to limit its rights to those acquired under the written contract.—*Miller & Lux* v. *Kern County Land Co.* Supreme Court of California. 99 Pacific 179.

DAMAGES FOR BREACH OF CONTRACT TO DELIVER WATER.—

In an action for damages alleged to have been caused by reason of defendant failing to comply with his contract to sell and deliver upon plaintiff's land a water right and a certain number of inches of water, it is error to admit evidence as to the value of buildings and improvements made by the plaintiff upon the lands in order to show the amount of damages sustained by him, unless it appears that no like water right could have been purchased at the time of the breach of the contract or at any time thereafter prior to the trial. In such case the measure of damages sustained is the difference between the contract price for the sale and delivery of the water, and the price for which such water and water right can be aquired at the time of the breach of the contract, together with whatever sum the purchaser had paid on the purchase price for such water and water right.—*Gagnon* v. *Molden.* Supreme Court of Idaho. 99 Pacific 965.

SHOSHONE.

Idaho.

Shoshone is one of the good towns, located in the best portion of the wonderful Snake River Valley of Southern Idaho. It has a population of about 1,500 people, is the county seat of Lincoln county, and is located on the main line of the Oregon Short Line Railroad and also on the branch railroad running from Shoshône to Ketchum and on the proposed electric road which is to connect all of the towns in this section of the country.

Shoshone has made wonderful progress during the last twelve months, and even the more conservative business men confidentially expect to see the town double its present population within the next two years. At the present time it is impossible to build houses fast enough to supply the demand. People are living in tents and old shacks of every description until new residences can be constructed for them. A large number of buildings are

being constructed at the present time and contracts have been let for a great many more.

Business in all lines is thriving and the people are prosperous. There are splendid openings here for any line of business. The town is especially in need of an up-to-date steam laundry and the citizens are ready and willing at any time to pledge a sufficient amount of business to justify the investment of necessary capital.

The reason for this remarkable growth on the part of Shoshone is very easily explained. Large tracts of land in the Snake River Valley are being settled up and put in cultivation under the immense irrigation systems. Land which has heretofore been considered worthless desert is now being irrigated and is recognized as one of the finest agricultural sections in the west. Lincoln county alone has about 750,000 acres which will shortly be watered by these immense irrigation systems. Professor Holden, the great corn expert of the Iowa Agricultural College, visited this section in October, 1908, and gave out the following interview:

"You may say for me that southern Idaho is the ideal place for the young man who is looking to make a start in life. Every acre of irrigable land in this section is worth, in yield or income, three times as much as the best land in Illinos or Iowa."

Your correspondent talked with men who went there three years ago with little or nothing and are now worth $10,000 to $30,000.

To the eastern farmer, living on high-priced land, having two or three sons, knowing they cannot all farm the home place, and wondering what is to be done, southern Idaho is recommended. The renter or the man with little money who cannot buy $100 to $125 land in Iowa, Illinois and other eastern states, is advised to purchase southern Idaho irrigated land while it can be had at present prices.

A large amount of this irrigated land is directly tributary to Shoshone. Some of these tracts have already been opened for settlement either under the Carey Act or the United States Government Reclamation Act. Part of the land will be thrown open for settlement in the spring of 1909. Shoshone is better located than any other town as a point from which to look over these irrigated lands. and for that reason an exceedingly large amount of transfer business is transacted there and this will continue for the next two or three years.

Shoshone has a wide-awake commercial club composed of the leading business men in the community. They will be glad to furnish all parties with information concerning Shoshone and the surrounding country. Write to them for information about this matter, or, better still, go out and look over the field for yourself and have a talk with the business men regarding the advantages of locating at Shoshone.

Reclamation Service News

The Secretary of the Interior has just issued instructions to the General Land Office which removes a difficulty that has been met in connection with entries under the Reclamation Act. In a circular of the General Land Office issued January 18, 1908, provision is made that after the requirements of the homestead law as to residence and cultivation have been complied with, the entryman or his heirs may make final proof of compliance with these requirements, after which he will be relieved of the necessity of residing upon the land.

The question arose whether after having made such proof the entryman could assign his interest in the land without forfeiting his right to a patent.

It has now been decided that patent will issue in the name of the original entryman in the usual manner, after such final proof has been made, and upon proof that at least one-half of the irrigable area of the entry is finally adjusted has been reclaimed, and upon payment to the proper officials of the government of the charges, fees and commissions which are due.

This communication contains the direct statement that so far as the department is concerned no legal objection will be raised to the assignment of the right of an entryman who has just made five year final proof, and that such assignment would seem to convey all the entryman's interest in the land, including the right of the assignee to a complete title by carrying out the additional requirements imposed by the Reclamation Law.

This order of the Secretary puts the reclamation homestead entries upon the same basis as original homestead entries in regard to assignments after final proof, and will thus remove one great difficulty that has been felt in some of the projects.

The Secretary of the Interior has received from the Burns Commercial club of Oregon a request that the Reclamation Service immediately take steps to demonstrate the existence of an artesian flow in Harney county, by sinking wells at central points in the several valleys, so that individual home-makers may have reasonably sure knowledge of the depth necessary to go for such water and of the amount to be found when reached. The resolution called attention to the fact that the state of Oregon has been a very heavy contributor to the Reclamation Fund and that circumstances have prevented the state from receiving its proportionate share in reclamation work. It is further stated that the artesian supply is the only visible source of water for reclamation purposes upon which settlers in Harney county can base a hope of permanent success.

Similar petitions have been transmitted to the department by Governor Chamberlain, together with a number of requests of like character from all parts of the arid West, which in the aggregate are so extensive that the entire Reclamation Fund would be necessary if these petitions were acceded to.

In reply to the petition of the Burns Commercial club, Secretary Garfield recalled the fact that on March 3, 1903, it was decided that the reclamation fund could not be used for the purpose of drilling artesian wells for exploration. Such wells may be paid for from the Reclamation Fund, only in cases where there is sufficient knowledge in advance to make it probable that the water will be obtained therefrom in such quantities as could be used for the irrigation of lands, with the probability that the cost of the work will be returned to the Reclamation Fund.

One of the most attractive units of the general Yakima project is that which it is proposed to develop in the former Yakima Indian reservation, a part of which congress, by the Act of December 24, 1904, ordered to be opened to settlement after proper allotment, classification and appraisement of the lands.

By a subsequent act of March 6, 1906, congress made specific provisions for the working out of a reclamation project upon the reservation. Among other things this act provides that the Secretary of the Interior may, with the consent of the Indian allottees, sell the part of their allotments in excess of twenty acres. Subsequent general litigation has authorized the sale of the entire allotment if the Indian allottee so desires. The proceeds of these sales are to be used for the benefit of the Indian first, in paying the charge under the reclamation Act for the irrigation of the area retained, and, second, for the individual benefit of the Indian in case there is any surplus.

After a long discussion in order to meet the many complications arising from the situation, the Indian Office and the Reclamation Service have reached a complete understanding as to the handling of this matter, as a result of which the Secretary of the Interior has just approved several forms of petition by the Indian allottees, the object of which is to authorize the Secretary of the Interior to dispose of their allotments in accordance with the terms of the law. It is understood that the Indian Office is now actively engaged in the preliminaries, and that field work is about to be undertaken to place before the Indians the great advantages which will accrue to them under this arrangement. It is expected that the Indians will appreciate the great opportunity offered to them to obtain high prices for their lands and that petitions can be obtained from a large proportion of the Indians.

The necessities of the case so far as the conditions under the Reclamation Act are concerned will require that a considerable number of the Indians shall file these petitions, as it is essential that the Reclamation Service shall have definite assurance of the financial success of

the project before undertaking to add to the expenditures already made the large amounts which will be necessary for construction.

One feature of the projosed project on the reservation which will be known as the Wapato project, is the low cost as compared with all the other projects in the valley. This will not only be an advantage to the Indians, as it will give them a very much greater demand for their land, but it will also make the project extremely attractive and cause it to be taken up very rapidly as soon as it is opened to entry.

Approximately 159,000 acres which were withdrawn in connection with the North Platte irrigation project, Wyoming-Nebraska, have been restored to the public domain and will become subject to entry and settlement on such dates and after such notice by publication as the Secretary of the Interior may prescribe. These lands lie in sections 33 and 34 north, ranges 77 to 80 west, sixth principal meridian.

In recognition of the untiring efforts of the Reclamation engineers and their assistants, who recently successfully performed the work of closing the Colorado river near Yuma, Arizona, Secretary Garfield sent the following message to Mr. Louis C. Hill, Supervising Engineer, at Phoenix, Arizona:

"I desire to express to you, and through you to your assistants, my personal appreciation of the excellent work accomplished in closing the Laguna dam, and especially of the energy, persistence and skill displayed in fighting the floods which at one time threatened the safety of the incompleted work. I know that at that time there was, on the part of different men, a display of devotion to the work which is worthy of the highest commendation.

"Very truly yours,
"JAMES RUDOLPH GARFIELD,
"Secretary."

The Secretary of the Interior has directed the Okanogan Water Users' Association to sell at public auction the excess lands in the area described in the public notice of November 12, 1908, announcing that water was ready for delivery to certain described tracts under the Okanogan irrigation project, Washington.

The amount of so-called excess lands for which water is now available on this project is 419.08 acres, distributed among eleven owners.

Before the Okanogan project was begun the land owners to be benefited were required to give a lien thereon to secure the payment of the water right charges, and those who held in excess of the maximum area which may be held by any one person were required to deed the same in trust to the Water Users' Association, with power upon direction of the Secretary of the Interior to sell and dispose of the same at public auction at or subsequent to the time when the Secretary of the Interior should announce that water was ready for delivery. This announcement was made November 12, 1908.

The notice of such sale must be published for five weeks, and the Secretary suggests that such publication begin not later than March 19, and that the sale take place not later than April 24, 1909.

Pending the completion of the Belle Fourche project, and in order to protect the interests of the United States and of prospective settlers, the Secretary of the Interior has withdrawn from all forms of entry the following described lands embraced in this project:

Belle Fourche Project, Black Hills Principal Meridian:

T. 10 N., R. 3 E.—All Secs. 23, 24 and 25.

T. 8 N., R. 4 E.—N. e. ¼ Sec. 10.

T. 9 N., R. 4 E.—All Secs. 1 to 6, 8 to 13, w. ½ and s. e. ¼ Sec. 14; all 15 and 16, n. ½ and n. ½ s. e. ¼ Sec. 21, n. ½ s. e. ¼, n. ½ s. w. ¼ and s. e. ¼ s. w. ¼ Sec. 22, n. ½ s. e. ¼ and n. ½ s. w. ¼ Sec. 23, e. ½ Sec. 24, n. ½ n. e. ¼ Sec. 27, n. ½ n. e. ¼ and n. ½ n. w. ¼ Sec. 35.

T. 10 N., R. 4 E.—All Secs. 19, 20 and 26 to 36.

T. 7 N., R. 5 E.—All Secs. 1, 2, 11 and 12.

T. 8 N., R. 5 E.—N. e. ¼ n. w. ¼ Sec. 5, n. ½ Sec. 6, n. e. ¼ Sec. 11, w. ½ s. w. ¼ Sec. 12, n. ½ Sec. 18, n. ½ n. w. ¼ Sec. 13, all Sec. 35.

T. 9 N., R. 5 E.—All Secs. 1 to 11, n. w. ¼ Sec. 12, n. e. ¼ Sec. 13. all Secs. 15 to 21, w. ½ and w. ½ s. e. ¼, s. e. ¼ s. e. ¼ Sec. 22, s. w. ¼ s. w. ¼ Sec. 23, s. e. ¼ Sec. 24, s. w. ¼ Sec. 25, n. e. ¼ n. w. ¼, w. ½ n. w. ¼ and s. e. ¼ s. w. ¼ Sec. 26, all Secs. 27, 28, 29, w. ½ and s. e. ¼ Sec. 31, s. ½ Sec. 32, all Secs. 34, 35 and 36.

T. 10 N., R. 5 E.—All Secs. 29, 30, 31, 32 and 33.

T. 7 N., R. 6 E.—All Secs. 4 and 5.

T. 8 N., R. 6 E.—All Secs. 1, 2, 3, w. ½ and s. e. ¼ Sec. 5, all Secs. 6 to 36.

T. 9 N., R. 6 E.—All Secs. 1 to 5, n. e. ¼ Sec. 6, n. ½ Sec. 10, all Sec. 11, w. ½, s. w. ¼ n. e. ¼, w. ½ s. e. ¼ Sec. 17, n. ½ and s. w. ¼ Sec. 18, n. w. ¼ Sec. 19, all Sec. 25, s. w. ¼ Sec. 30, w. ½ and s. e. ¼ Sec. 31, all Secs. 34, 35 and 36.

T. 10 N., R. 6 E.—All Sec. 31, s. ½ Sec. 32, all Sec. 35.

T. 7 N., R. 7 E.—All Secs. 1 to 6 and 12.

T. 8 N., R. 7 E.—All Secs. 4, 5, 6, w. ½ and s. e. ¼ Sec. 7, all Secs. 8, 9, 10, 14, 15, n. ½ n. e. ¼ Sec. 17, all Secs. 22 and 27 to 34.

T. 9 N., R. 7 E.—E. ½, s. ½, n. w. ¼ and s. w. ¼ Sec. 18, all Secs. 19, 20, 29, 30, 31, 32 and 33.

An extension of ninety days has been granted to Messrs. Campbell and Huffman of Klamath Falls, Oregon, within which to complete their contract for the construction of wooden flume in connection with the South Branch Canal, Klamath irrigation project, Oregon-California. An unavoidable delay in obtaining satisfactory lumber for the work made this extension necessary. The contract should now be completed on March 15, 1909.

Public notice has been issued under date of March 3, 1909, affecting all lands opened to irrigation on the North Platte project, Nebraska-Wyoming, by former notice of July 29, 1907, being what is known as the First Lateral District.

The portion of the annual installment of the water right charges covering operation and maintenance is increased from 40 cents per acre to $2.00 per acre, payable prior to April 1, 1909, but the water users are given the alternative of subjecting their lands to charges upon a new basis which has been agreed to by the Water Users' Association.

The new plan is available for all lands upon which payment has been made of the 40 cents per acre charged for operation and maintenance for 1908, and provides for a charge of $45 per acre instead of $35 as in the original notice, and for the first two years the charge has been reduced to $2 and $3, respectively, without any charge for operation and maintenance, the remaining $40 to be paid in eight installments of $5 each, plus such charge for operation and maintenance as may be hereafter fixed. For such applications there shall be no charge on account of operation and maintenance for expenses incurred prior to January 1, 1911.

Those who have already applied for water under the old notice may amend their applications to conform to the new rates if they had paid the 40 cents operation and maintenance charge for 1908. All new applications for lands in the First Lateral District covered by the notice of July 29, 1907, must conform to the new rates, the first payment thereunder being $2.40 per acre.

An extension of sixty days has been granted to Mr. Leonard Seitz, of Vale, South Dakota, within which to complete his contract to construct a portion of the South Canal, Belle Fourche irrigation project. On account of the unusually severe weather the contractor was unable to perform any labor for several months, and the date of completion has therefore been set forward to April 30, 1909.

The Reclamation Service has been advised that certain people in North Yakima, State of Washington, have undertaken, for a consideration, to locate intending settlers upon the Tieton project nearby, the terms being a payment of $50 in advance on condition that in case of difficulty in making the entry the claim would be appealed to the Secretary of the Interior and if the final decision be favorable the locator and his attorneys are to receive $500 additional.

The lands in question are within the Tieton project of the United States Reclamation Service and have been withheld from entry under the terms of the law pending the final location of necessary irrigation works. The irrigation project is approaching completion and such of the lands as are irrigable will be opened to entry within one or two years after due notice through the local land office and the public press.

These lands are understood to be extremely valuable when under irrigation and much interest is displayed by those desiring to make homestead entry for them.

Any representations by any person of special information regarding entry of lands under conditions more favorable than those offered to the public in general are fraudulent and entirely without foundation. These lands will not under any circumstances be opened to entry except after due notice to the public and in such manner as to give all persons equal opportunity of presenting homestead applications to the local land office at North Yakima. The attention of the Postoffice Department has been called to this matter, as the persons making such representations are subject to punishment if they circulate such matter through the mails, by newspapers or otherwise.

The following contracts for the installation of steel lateral and sub-lateral headgates in the Belle Fourche irrigation project, South Dakota, have been awarded:

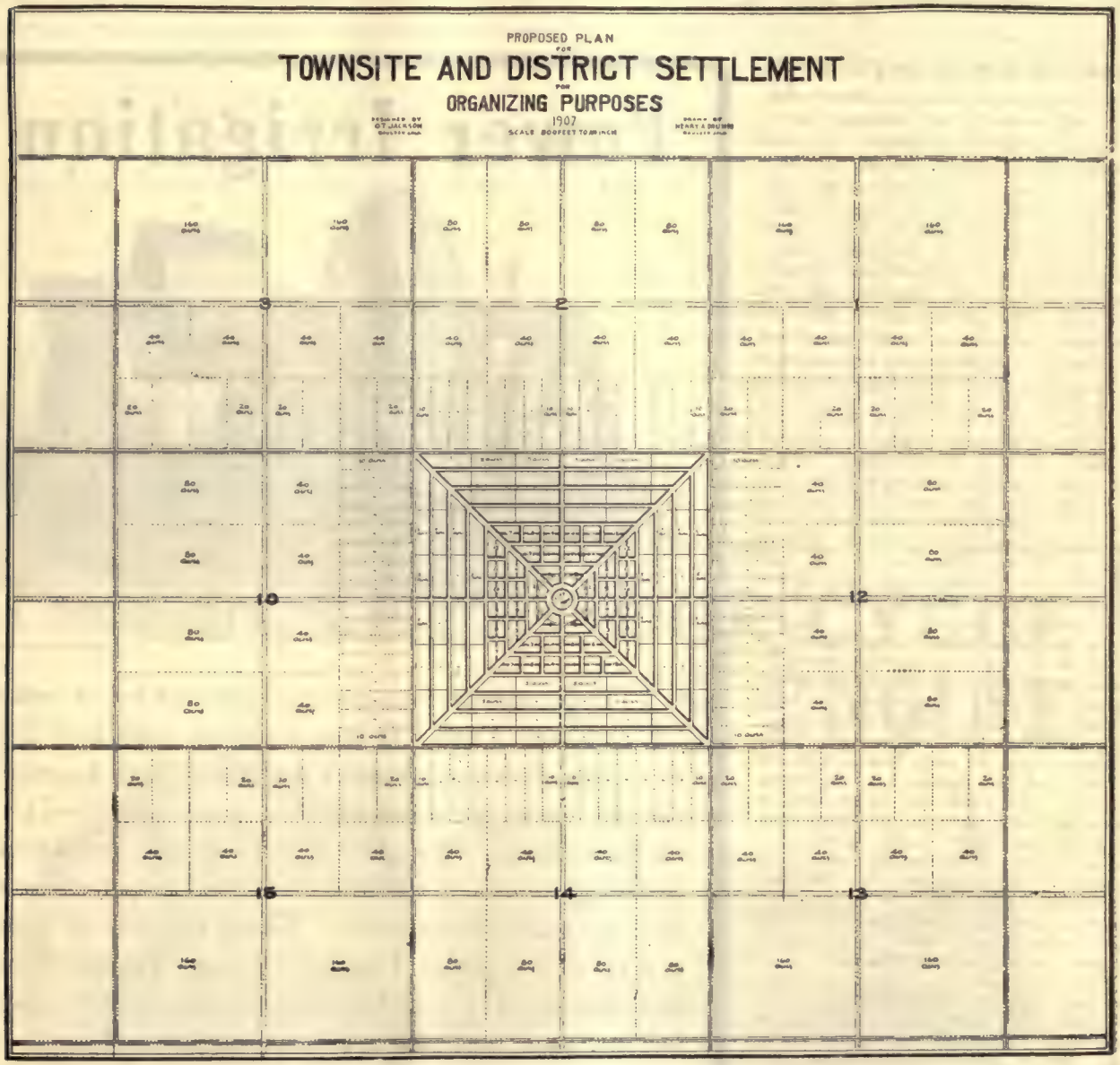
To the Greeley Headgate Company, of Greeley, Colorado, 126 headgates, $2,079.74.

To the Coffin Valve Company, of Boston, nine gates; contract price, $861.96.

NEGRO SETTLEMENT AND TOWN SITE PLAN.

Colorado is State Chosen.

An innovation in the way of developing a district and town site company has been brought to our attention by Mr. O. T. Jackson, a prominent colored man of the state of Colorado. Mr. Jackson and a number of his colored friends have made an effort to solve the problem of making it possible for the negroes to become self-supporting as agriculturists, and at the same time own town site property on a community plan which will have a decided uplift tendency.



Negro Settlement and Town Site Plan in Colorado.

This project is known as the Negro District and Town Site Company, and has been submitted to the State Land Board of Colorado by the Negro Business Men's League of that state. The State Land Board controls at present 3,699,729 acres of land within the boundaries of the state of Colorado. Dr. Jefferson, registrar of the Land Board, is favorable to the plan, and

will look up the counties and townships containing sufficient indemnity agricultural lands with water possibilities, the object being to secure the land in one body.

We are presenting herewith an illustration of this town site plan. Prominent negroes throughout the country are becoming interested, and it is the opinion of the promoters of the project that much good will come to the colored race as a result of this move.

The citizens of Colorado, generally, are lending aid to this movement. As soon as the registrar of the Land Board announces that his report has been received, a committee of the subscribers will be selected to go out in company with the state engineers to investigate lands and location.

Any one who is interested in establishing such a race enterprise can subscribe to the capital stock of the prospective company.

Complete information and literature will be furnished by Mr. O. T. Jackson, whose address is R. F. D. No. 1, Boulder, Colorado.

After sufficient subscriptions have been received the names will be submitted to the governor of the state

CAPTAIN JIM: HE SAVES LIVES.

The life-saver is never a demonstrative fellow and rarely communicative; also, he lacks imagination. You can argue with Captain Jim by the hour that his life is a hazardous one, and of exceeding interest to those engaged in more peaceful pursuits, but in vain. Only the details of his daily duties, which are many and arduous, seem to appeal to him; the romantic side, the perilous side he sees not at all. He will talk by the hour of life-buoys and life-lines, of night signals and wireless telegraphy, of searchlights and motor life-boats; but of himself, who is the life and power of it all, nothing.

The government report is the sole history of our unpretending "heroes of peace," and a very dry history it is. The story of San Juan Hill has been told in newspapers, magazines, and books in detail and at length. But of nearly twenty thousand wrecks and rescues not a word is printed, save a bare record of the time, place, lives and property saved.

In every instance a small band of men went out to a mortal struggle, sometimes right up to the verge of death. A few went over the verge, so simply and quietly that their names remain unhonored and unsung. They battled alone, far away from towns and cities, and the applause of watching crowds. They had the direst odds to contend with, and no stimulus save that of their own stout hearts and sense of duty. In nearly every instance they brought to huddled wretches staring death in the face the glory of life, and they gave sunshine and joy to many a home. But of them scarce a word has been told.

It is impossible to cite even a few daring, almost superhuman, rescues; it would be unfair, too, to the rest of the twenty thousand, and, suffice it to say, that in these wrecks, since 1891, more than one hundred thousand souls were at stake and saved with a loss of less than one in one hundred.—From the December Circle Magazine.

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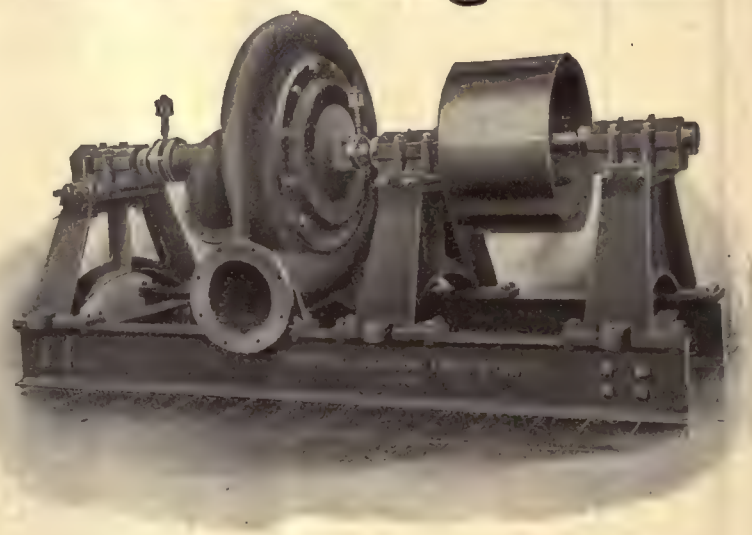

This is one of four pumps installed by us near Green River, Utah. It was designed especially for the Elgin Power & Water Company. Full description of their plant appears on pages 169-70-71. of this paper. We design and equip irrigation pumping plants to fullfil the exact requirements and can guarantee results. Ninety per cent of such plants in Colorado, Utah and New Mexico were installed by us. Note the class of equipment we use. Be sure and read the article on pages
Send for estimates of cost of plant and costs of irrigation per year, letting us know your requirements, to Irrigation Department.

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and the Land Board to demonstrate the number and class of persons and the interest they take in such a plan for the betterment of the condition of the colored race.

The plan for acquiring the land as submitted to the Land Board is that each district purchaser of a farming tract deal directly with the state, thus avoiding any possible risk to the settler in dealing with a third party.

The center section, or town site, which is shown herewith, is to be purchased by the company, and paid for outright, and is to be platted and sold in town lots in order to raise a fund to protect the settlers and establish a department store; to erect buildings for local merchants who are not able to buy a lot and build at first. The rents and profits from the sale of town lots will provide a permanent dividend for stockholders. The money derived from the sale of the company's stock and lands will also provide and pay for the employment of the laborers and mechanics who may settle in the district.

This is a worthy move on the part of the colored men of the country and should be encouraged. There is no doubt but that a settlement of colored people on land will make them more thrifty and eventually develop a prosperity among that race which is impossible where they are confined to city conditions.

It is hoped that those of our readers who are interested in this subject may communicate with Mr. Jackson and offer him such encouragement as his work justifies. A kindly word to any of the members of the committee who are carrying out this plan will do much to stimulate them to nobler and higher effort.

IRRIGATION IN VICTORIA.

BY H. G. M'KINNEY, M. INST. C. E.
(In Engineering Record.)

The subject of irrigation in New South Wales and the manifold benefits arising from irrigation have been dealt with in innumerable speeches, reports and newspaper articles during the past 25 years. At every general election, and during every drought, many torrents of eloquence on this subject have been poured out over the heads of the electors. It would almost appear that the possibility of being deprived of such an excellent stock subject as the necessity for irrigation might to some extent account for the fact that many of the politicians who made long speeches regarding it were lukewarm, if not hostile, when any practical steps were proposed. As regards the general fate of reports dealing with it, the words of Dickens in his immortal chapter on "The Whole Science of Government," are fairly applicable. In describing what happened to complaints, applications and other matters which reached the Circumlocution Office, Dickens said: "Boards sat upon them, secretaries minuted upon them, commissioners gabbled about them, clerks registered, entered, checked and ticked them off, and they melted away." However, New South Wales is at last embarked on an active policy of construction of large irrigation works, and it is, therefore, a matter of present interest to consider the financial aspect of the question.

As Victoria is fully a quarter of a century ahead of New South Wales in regard to the construction of irrigation works, and as the vigorous irrigation policy of that state is often held up as an example to New

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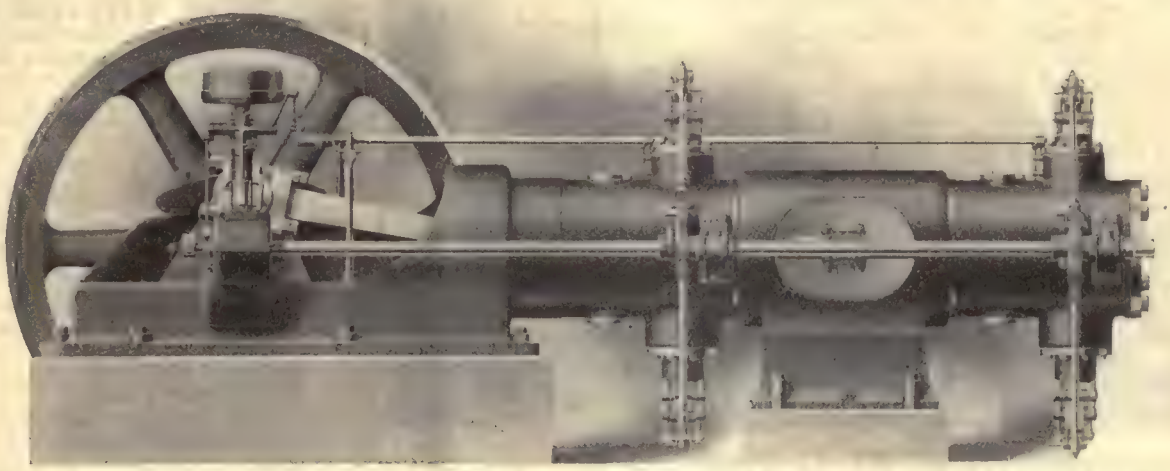

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South Wales, it is instructive to compare the conditions in the two states, to consider what has been done in Victoria, and to examine the results accomplished, and the cost at which these results have been attained. On examining the map of Victoria we find that of the total area, amounting to about 87,000 square miles, about 51,000 square miles belong to the basin of the River Murray. Of this area of 51,000 square miles, the northern plains and the mallee country represent 34,000 square miles. The northern plains are the great field for irrigation in Victoria, their contiguity to the River Murray, and the fact of their being intersected by a series of tributaries of that river, affording excellent facilities for irrigation on a large scale. The relatively great area of these plains, the fertility of their soils and their comparatively moderate distance from Melbourne combine to render them of vital importance to Victoria. On the other hand, the great field for irrigation in New South Wales—that is, the district between the Murray and the Murrumbidgee and the plains on the north side of the latter river—though fertile and valuable in a high degree, occupies no such relative position in New South Wales as is occupied by the northern plains of Victoria in that state. It is necessary to bear this difference in mind when considering the manner in which the financial aspect of irrigation has been treated in Victoria and the manner in which it is likely to be treated in New South Wales.

In the early eighties the question of irrigation in Victoria was brought prominently to the front, largely through the eloquence and enthusiasm of Mr. Deakin, who was then premier and minister for water supply. A series of valuable reports were jointly prepared on the subject of water conservation and irrigation by Mr. George Gordon, M. Inst. C. E., chief engineer for water supply, and Mr. Alexander Black, surveyor-general. The former had a wide experience of irrigation in India, while the latter had a comprehensive knowledge of the natural conditions and of the conditions of land occupation in Victoria. Unfortunately, at the outset the business aspect of the irrigation question was lost sight of, and, judging from the subsequent report of a Royal Commission, it would appear that the main object in view was to create what Americans would describe as a great irrigation boom. The first important step was to discard the advice and dispense with the services of the only experienced irrigation

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engineer in that state—Mr. George Gordon. Then followed a period of mismanagement and extravagance which did much to discredit the cause of irrigation in Australia. Although Mr. Deakin visited America in the early part of that period, and published a most instructive and valuable report on irrigation in the western states, showing how splendid progress was being made without the expenditure of a single dollar of public money, the lessons to be derived from this report were entirely disregarded in Victoria. Under the authority of a special Act of Parliament, irrigation trusts were authorized to borrow money from the government of that state for the construction of irrigation works, and such trusts were rapidly constituted in all directions. Applications for loans quickly poured in, and were met with a lavish hand. No time was lost in spending the money thus advanced, while, at the same time, the government energetically entered on the construction of irrigation works, which were described at "national."

When the time arrived for dealing with the question of bringing the works into operation and of obtaining some return from them, the boom ended abruptly. The irrigation trusts were soon found to be in an unsatisfactory financial position, and there arose a widespread demand for inquiry and investigation. The result was that a Royal Commission was appointed to inquire into the whole subject of irrigation and rural water supply, for in addition to numerous irrigation trusts there was a considerable number of trusts which dealt only with water supply for stock and domestic purposes. The report of the commission was issued in 1896, and the following extracts will show that the description already given of the state of affairs at that time is fully warranted. In the summary of its conclusions, the commission's report has the following: "It is now 10 years since the Irrigation Act was passed, and the majority of the trusts are seemingly not taking any more active steps for meeting their loan obligations than they were shortly after being constituted. The principal reason for this unsatisfactory condition of affairs is that in the case of many of the trusts there was no justification for their formation, and in the case of others that the works were constructed far in advance of the present requirements of the districts. A contributing cause was that in many instances the cost of the works greatly exceeded the original estimates. Our investigations have led us to the conclusion that the great majority of the trusts never should have been constituted, and never would have beeen, had the schemes submitted for departmental approval been considered from an ordinary common-sense standpoint." . . . "Unfortunately, however, the public mind was excited at the time, and the gospel of irrigation was preached from one end of the colony to the other. The farmers had been suffering from a cycle of dry seasons, the price of produce was high, and the prospect of insuring their crops against the exigencies of climate by means of irrigation appears to have overruled all prudential considerations. Schemes were hastily conceived, and as hastily carried out. The question as to whether the cost of the undertaking would be commensurate with the benefits to be derived therefrom, or whether the land could bear the burden that would be placed upon it, was apparently lightly considered, if considered at all. Trusts have been formed and extensive

(Continued on page 187.)

IRRIGATED LAND

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Some of the richest and most productive farm land in the world lies along the Shoshone and the Big Horn Rivers in the "Big Horn Basin" of Wyoming. Over ten million dollars is being spent by the United States Government and by private enterprise in building great concrete dams and ditches in order to lead an inexhaustible supply of water to irrigate some of the best of these lands and make them independent of rainfall. A great portion of this work is completed, and these lands, with a perpetual supply of water for irrigating them, are now offered you on reasonable terms.

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to get a wonderfully productive farm, with water whenever you want it, regardless of rainfall; in a country where a single crop can be made to pay for the land; where 50 bushels of wheat or barley, and 75 bushels of oats are commonly grown to the acre; where fruits grow luxuriously and where the glorious air and sunshine, summer and winter, make life a joyous thing.

This wonderful country is developing fast. Churches and schools abound. The population is intelligent, Godfearing and law-abiding, and any man out there who is half a man has the opportunity to make himself independent.

Land in this great country is going fast. If you have any thought for the welfare of yourself or children, find out all about this opportunity to-day.

Send for our new folder with large map, and **also folders issued** by the private irrigation companies and by the United States Government Reclamation Service **giving all information about these lands, terms, etc. Free for the asking.** Study these folders and then **come with me** on my next excursion to the Big Horn Basin and see for yourself. My excursions, which I personally conduct, leave Omaha on the 1st and 3d Tuesday each month, on which days reduced railroad rates are in effect. My services are free to you.

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Plant lice are the most serious orchard pests in Colorado at the present time. Different species of these lice injure the apple tree—both above and below ground—the peach, the plum, and the cherry.

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Information is given in regard to sprays and spraying, banding, mounding and cultivating, trimming, treating below ground, and use of tobacco dust and stems.

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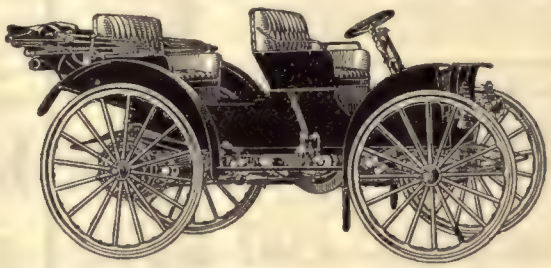

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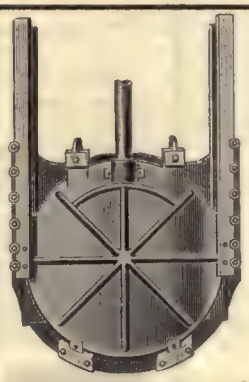

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works constructed in districts where the water supply for irrigation is practically nil." The commission gave a number of instances bearing out these conclusions, and, in referring to the reports of Messrs. Gordon and Black, added: "We are sorry to say that the advice of these experts has been practically unheeded, as apparently not any of their valuable warnings and recommendations have been adopted either by the irrigation trusts concerned, by the department which paid the experts for their reports, or by the governments which advanced the money to construct the vast irrigation works of the colony."

It is necessary to explain that the rivers in connection with which by far the greatest expenditure had been incurred up till the period of the commission were the Murray, the Goulburn and the Loddon. In regard to the last-mentioned river, the report of the commission summed up the position as follows: "Six trusts have been constituted in this district, with a gross area of 274,910 acres. The water available, after making allowance for the demands of riparian owners and the Loddon United Waterworks Trust, and for losses by percolation, is, according to the estimate of the department, only sufficient to irrigate 53,479 acres annually, or about one-fifth of the area comprised within the trust's territories. £222,649 of state money has been advanced to these trusts, and this has been expended in the construction of channels capable of commanding about 217,000 acres. Consequently the great proportion of the money advanced has been adsolutely thrown away. The matter does not end here, however, for the six trusts mentioned are debited with £145,000, their share of the cost of the Loddon national works, and are expected to pay £5,800 a year as interest on this liability. The result is that 274,910 acres have been saddled with a liability of £376,649, although, as far as irrigation is concerned, only 53,479 acres can be directly benefited by the expenditure."

Up till the time of the report of the commission in 1896 the amount of loan money expended on irrigation works in Victoria, including arrears of interest, was $1,801,854. The total area irrigated in the year 1895 was only 120,677 acres, and of this area only 50,706 acres was under crops, vines and fruits, the balance being merely pasture land, which had been flooded. Thus, for every acre under crop there had been an expenditure of more than £35 10s, or, taking both crops and pasture land, the expenditure amounted to nearly £15 an acre.

After the issue of the report of the Royal Commission, a period of writing off of capital and interest set in. Up till June 30, 1905, the amount of capital thus written off was £724,776, while the amount of interest written off was £323,733. The outstanding arrears of interest at that time amounted to £12,946. The amount expended on irrigation, through the agency of the trusts, was £1,122,087, while that expended by the government direct on the so-called national works was £969,439. Thus the actual outlay on works up till 1905 was £2,091,526, and the extent of the irrigation due to this expenditure amounted to only 165,656 acres. The figures available do not show the proportion of this represented by pasture land; but even if the whole area was under crops, the result was very poor for such a great outlay, the latter being over £12 12s for every acre irrigated. This is a miserable record compared to what should have been done. There are at least ten of the western states of America in which the area of irrigation is much greater and in some of which it is ten times greater than in Victoria, and in every instance the taxpayer has not been asked for a single dollar of the outlay required. The principle which has been recognized and acted on is that wherever private enterprise is able and willing to carry out irrigation work it should be afforded every facility for doing so. The magnificent result of this policy has been that last year ten millions of acres were under irrigation in the United States.

Within the last year great extensions of the irrigation works of Victoria have been taken in hand, and, at the same time, the late minister of water supply, Mr. Swinburne, passed and brought into operation an Act of Parliament which is probably the most comprehensive measure of its kind in any part of the British dominion. This act places the control of the irrigation trusts, and the whole management of the irrigation works of the state, in charge of three commissioners. For the position of chairman of this commission the Victorian government has had the good fortune to secure the services of Mr. Edward Mead, who resigned from the position of chief of irrigation investigations in the United States to take up that office. But after 20 years of such engineering and management as was described and characterized by the Royal Commission, it is very doubtful whether even such an experienced engineer and manager as Mr. Mead will be able to place the irrigation works of Victoria on anything like a satisfactory business footing. From the terms of the Water Act referred to, and from the discussion which took place in the Victorian Parliament regarding it, the inference which may fairly be drawn is that from the general taxpayer's point of view the irrigation works must be regarded as a permanent and hopeless failure. Waterworks districts are constituted under the act to take the place of the trusts, and a general rate is to be levied on all lands included in these districts for the supply of water for domestic and stock purposes. The following words of the act, relating to this subject, are of special interest: "Such rate may be made for one year, and shall be of such amount in the pound of the rateable value of such lands as may be necessary to recoup the proportion of interest on cost of works (except such works as are by this act or shall be by some future act of Parliament declared free head works), and of maintenance and management thereof, properly debitable in respect of the service rendered by the works as the commission may determine." In order to make clear the importance of the exemptions here made it is necessary to explain that under the designation of "free head works" are included storage reservoirs, diversion weirs, head works and main canals.

In addition to the general rate for water supply for domestic and stock purposes the commission is empowered to levy a special rate for irrigation in any water district after giving notice in the "Gazette" that such district is supplied with water for irrigation. The land may be subdivided into three classes, according to the facilities for distributing the water, and the rate for the land of the highest class is to be one-fifth of the net annual value, according to the valuation made under the direction of the commission.

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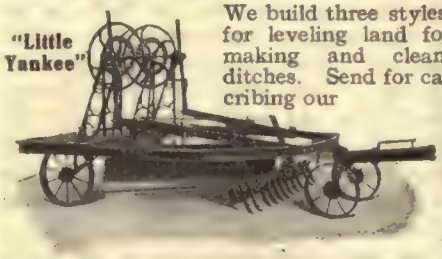

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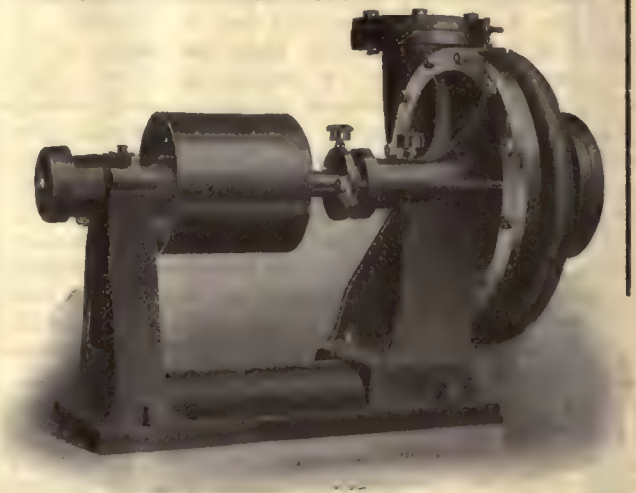

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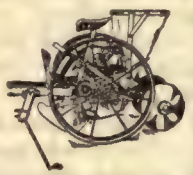

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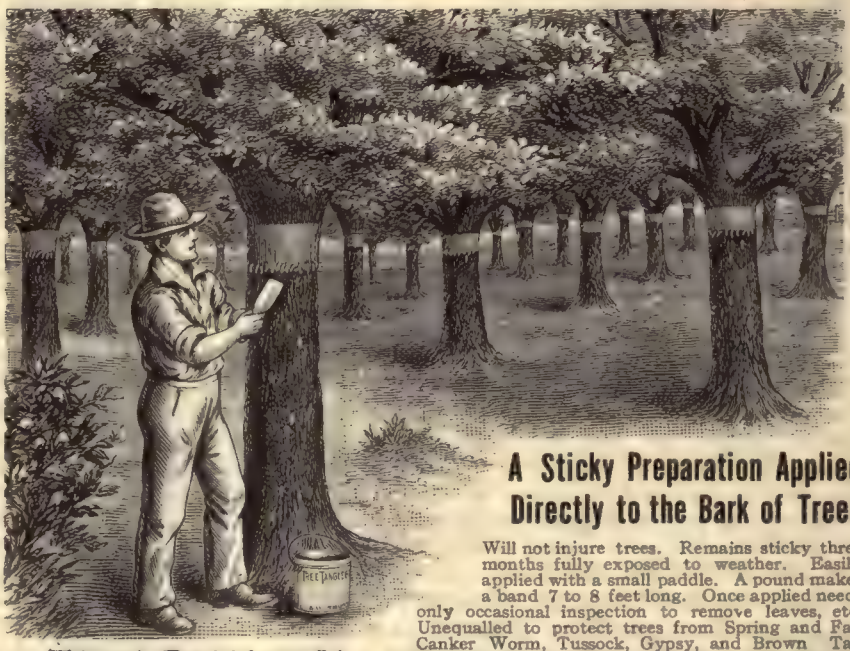

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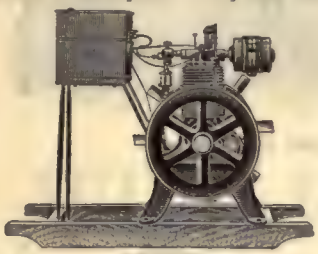

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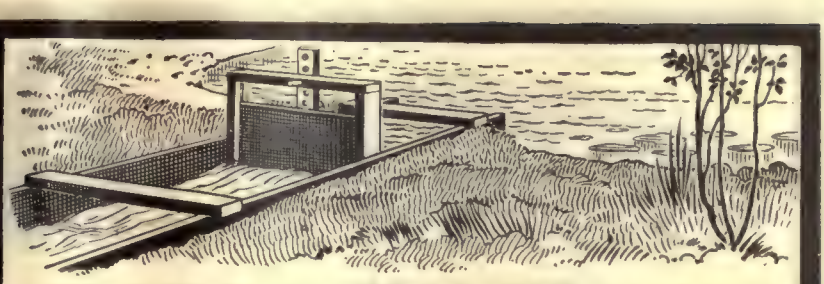

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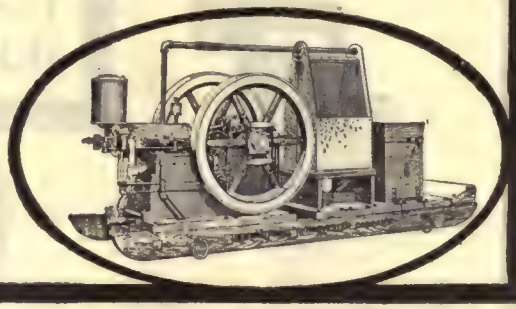

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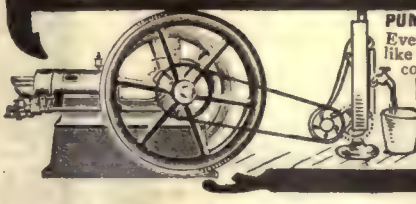

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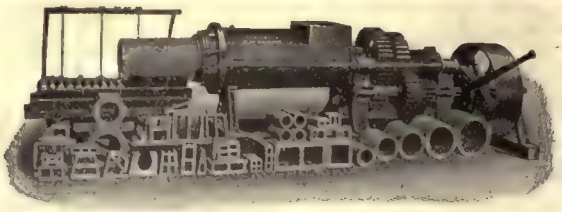

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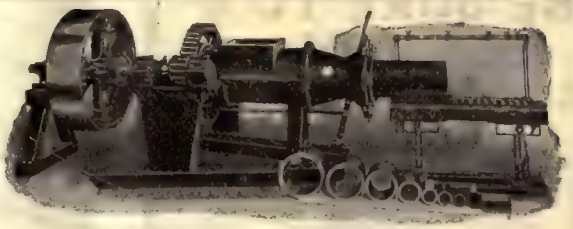

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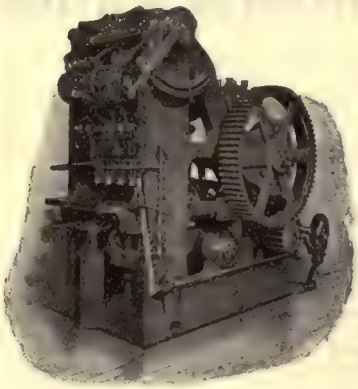

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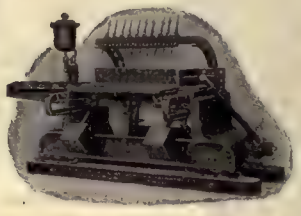

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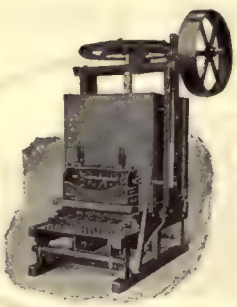

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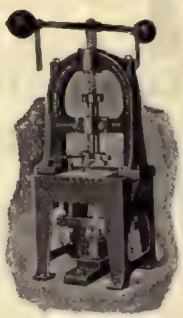

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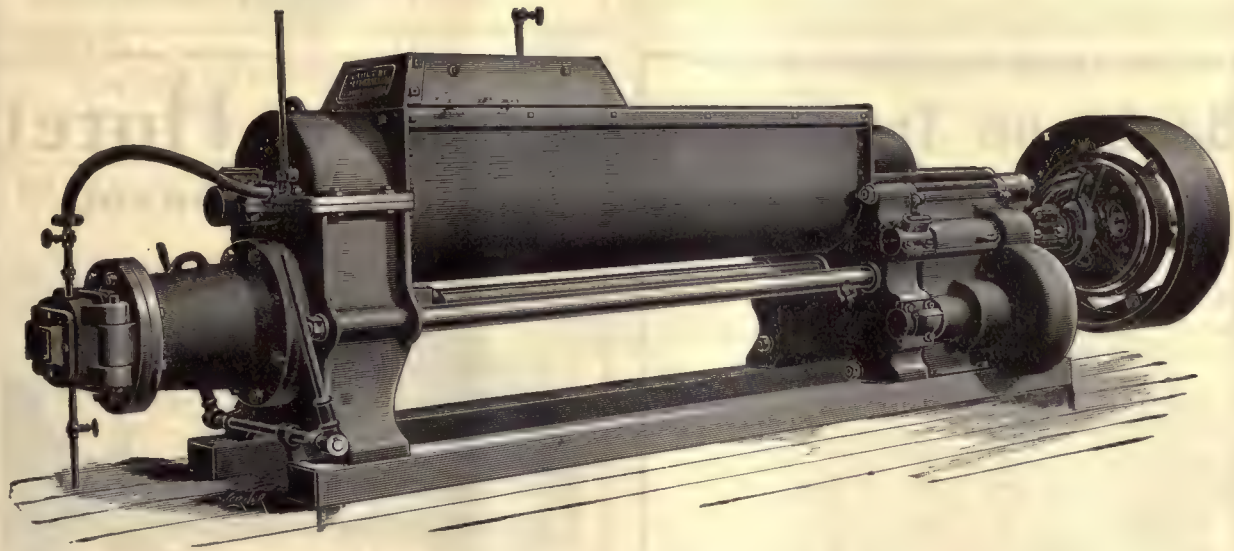

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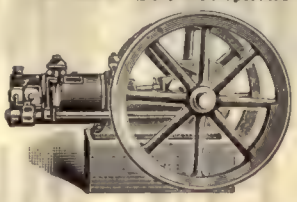

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The *Irrigation Age* has established a book department for the benefit of its readers. Any of the following named books on Irrigation and Drainage will be forwarded, postpaid, on receipt of price:

Irrigation Institutions, Elwood Mead	$1.25
Irrigation Engineering, Herbert M. Wilson	4.00
The Primer of Irrigation, Anderson	2.00
Irrigation and Drainage, F. H. King	1.50
Irrigation for Farm and Garden, Stewart	1.00
Irrigating the Farm, Wilcox	2.00
Practical Irrigation, Aug. J. Bowie	3.00
Practical Design of Irrigation Works, W. G. Bligh	6.00
Irrigation (as a branch of engineering), Hanbury Brown	5.00
Earth Slopes, Retaining Walls and Dams, Chas. Prelini	2.00
Road Preservation and Dust Prevention, Wm. P. Judson	1.50
Practical Farm Drainage, Chas. G. Elliott	1.50
Drainage for Profit and Health, Waring	1.00
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Land Drainage, Miles	1.00
Tile Drainage, Chamberlain	.40

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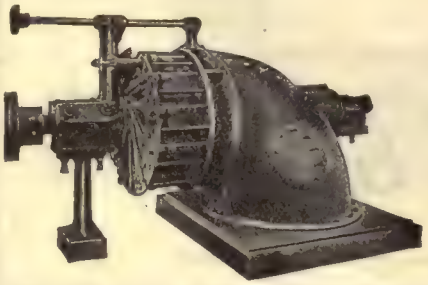

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We call that a pretty convincing argument, and one that should mean more to you if you are going to buy a buggy, than all the extravagant claims made in the most beautiful colored catalog ever written. This letter proves that when it comes to buggies, **we are acknowledged privately by other manufacturers themselves to be leaders in price and quality.** Why shouldn't we tell you about it? You ought to know it, too.

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as well as the higher grades. No matter what kind of a buggy you want to buy, if you haven't gotten our catalog and price list you haven't struck **"rock-bottom" in buggy buying yet.** Our rigs are stylish, up-to-date, strong, and built **right from top to tire.** Above all, the price in every instance is as low as the quality of the job and our small profit will permit. Send today for our catalog and see for yourself why other manufacturers are complaining about our low "Factory-to-User" prices. Runabouts **$21.50** to **$62.00.** Top buggies **$28.50** to **$110.** Surreys **$56.50** to **$110.** **We have 35 styles of Top Buggies priced from $40 to $60.** Among these you are sure to find just the rig you want at a price much less than you have expected to pay. Every buggy is covered by our "Iron-Clad Guarantee." Write for catalog.

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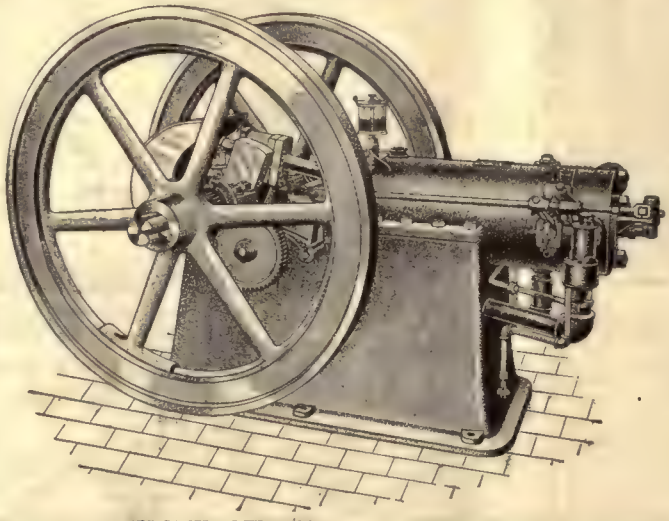

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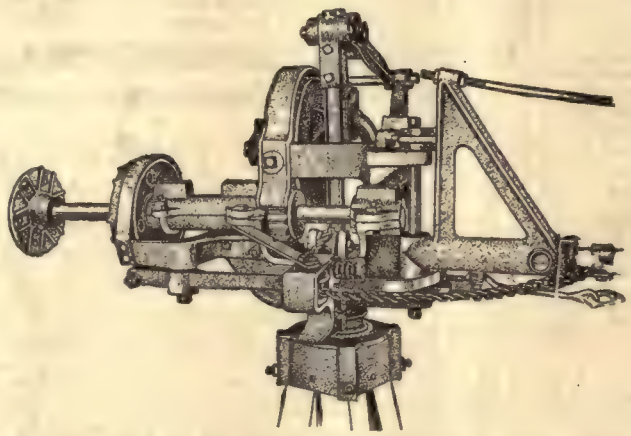

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IRRIGATION AGE

VOL. XXIV

TITLE REGISTERED U.S. PATENT OFFICE

CHICAGO, MAY, 1909

№ 7

SPECIAL IRRIGATION CONGRESS NUMBER

THE 17TH NATIONAL IRRIGATION CONGRESS WILL BE HELD AT SPOKANE, WASH., AUG. 9-14, 1909.

150,000 Acres of Rich Irrigated Land in the Eden Valley

Southern Wyoming is now open for entry under the Carey Act.

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You may secure a filing on a claim in Eden Valley without leaving your own home.

Of all the larger projects this is the only one on which the company has been able to deliver water to land promptly on time and without asking for an extension of time.

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Potatoes do well under the Eden project and large profits are derived from them.

Any time within six months after water is turned on you can obtain title to your land.

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VOL. XXIV. CHICAGO, MAY, 1909. NO. 7

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The Austin Drainage Excavator

Digs a ditch with sloping sides and smooth bottom in one operation.

Digs soil containing stone up to the size that will go into the buckets.

Digs a deep ditch at the same unit cost as a shallow ditch.

Digs a ditch that can be lined for irrigation without trimming or shaping up of any sort.

Deposits the soil in even banks with a wide berm between ditch and spoil bank.

Moves along the work under its own power as fast as the ditch is dug. It will also travel across the country from ditch to ditch.

THE ECONOMY TO CONTRACTORS in using Austin Drainage and Irrigation Earthwork Machines comes from the fact that each of them is a special machine, designed to do one kind of work better and more cheaply than any other machine can do it.

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DEMING PUMPS THE WORLD'S BEST

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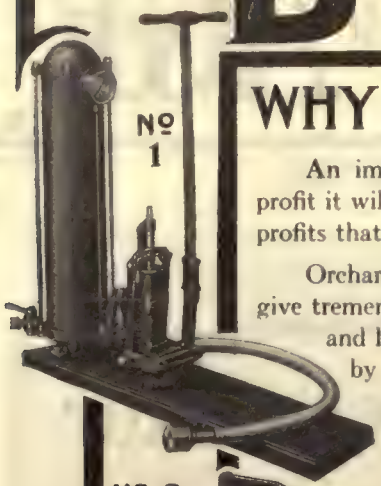

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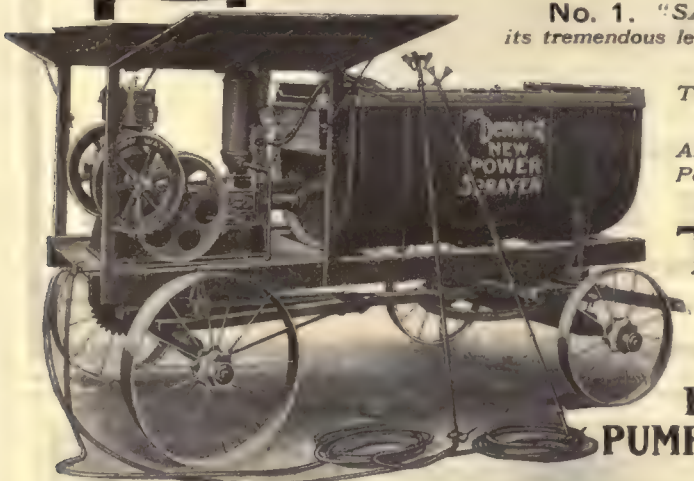

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Fourth—When vibrations are overcome, as in the "Master Workman," the lighter the engine and the less cumbersome it is, the greater its sphere of usefulness and the cheaper and more convenient it can be handled.

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Our Pump.....	$100.00	$620.00	$720.00	$4.00	$1200.00	$1920.00	$940.00
The other Pump	100.00	960.00	1060.00	6.00	1800.00	2860.00	

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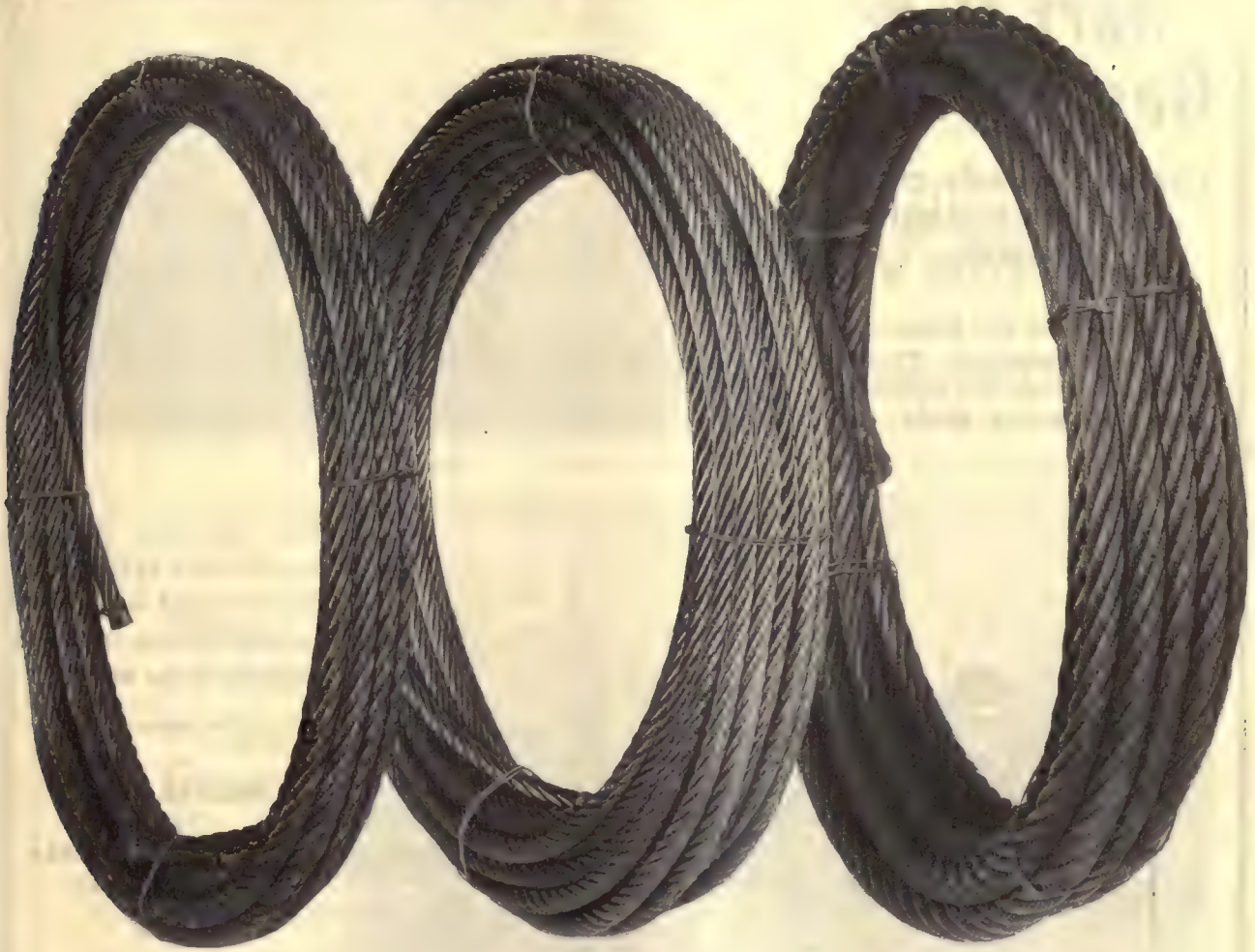

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IN the great work of reclamation of the submerged lands of the Mississippi Valley there is no more active mechanical factor than our dredge rope. We make this rope with full knowledge gained from years of experience in the hard usage to which it is subjected, than which perhaps no other service can show an equal. There is not the same risk of life that goes with the operation of an elevator or a mine hoist, but there is greater wear, necessitating a very close study of the requisite quality of material and also experience in manufacture, to produce a flexible, reliable and durable dredge rope.

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Are the **Huntley** and **Lower Yellowstone Reclamation Projects** of the Government, which will reclaim some 90,000 acres of land. Either of these projects provides a rare opportunity for intending land purchasers to obtain homes at low prices and on easy terms.

There is an immense area within a radius of 100 miles of Billings which can be irrigated and made to produce Grains, Grasses and Alfalfa.

Between **Glendive, Miles City, Billings** and **Livingston** there are approximately 160 miles of private canals covering nearly 70,000 acres of as fine land as lies out of doors--capable of producing all sorts of temperate zone crops and for sale at low prices.

Irrigation has already made the Yellowstone Valley a garden spot in Montana and developed one of the most fertile regions in the West. The country is still in the development stage and NOW is the time to locate there. Prices paid for products are high, while the cost of land is still low This is the **Homesteader's Opportunity.**

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We offer one proposition of 2,000 acres, land and water, near Santa Fe Railway in New Mexico at $25.00 per acre, and we will complete the water system; worth net per acre $60.00, to colonize.

One proposition of 100,000 acres, both land and water, at $20.00 per acre, fine soil and climate, best fruit land in the West, right on a trunk railway. This land can easily be colonized at $100.00 per acre.

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We have five or six others in various stages of development, to sell to syndicates or brokers where large profits can be realized.

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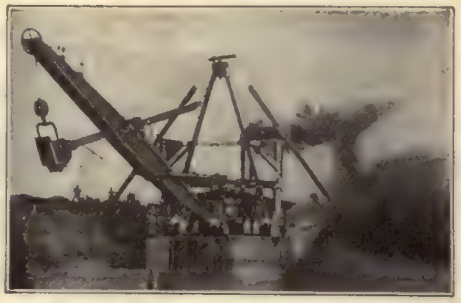

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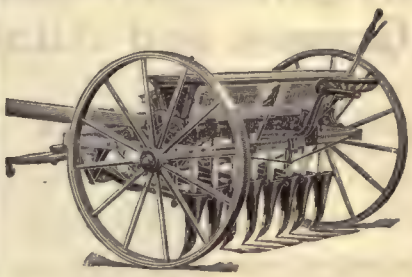

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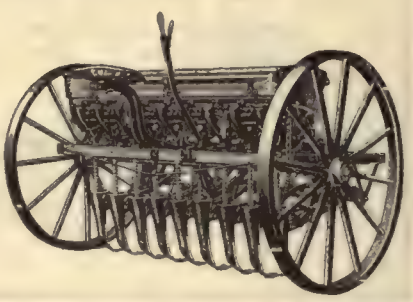

THE IRRIGATION AGE

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THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION — THE DRAINAGE JOURNAL
THE IRRIGATION ERA — MID-WEST
ARID AMERICA — THE FARM HERALD

IRRIGATION AGE COMPANY,
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D. H. ANDERSON, Editor

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, $2.00. If ordered in connection with subscription, the price is $1.50.

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It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 24 years old and is the pioneer publication of its class in the world.

Edward H. Harriman.

In going over the proof sheets of this, our Irrigation Congress Number, and after studying the various descriptions of development in both town and country along the lines of the transcontinental roads, the thought came to us that perhaps all of this would not have been possible had it not been for the masterful hand of E. H. Harriman, who has done so much for the Union Pacific and Southern Pacific Systems. Without the assistance of a man of this character it is safe to say that the west would be many years behind its present condition of development. Mr. Harriman stepped in at a time when the west was hungry for good transportation facilities and for aggressive action to open up new areas. In every instance where his lieutenants have demonstrated that a line would be a benefit to some particular locality and at the same time be reasonably sure of paying running expenses with a chance for ultimate profit, Mr. Harriman has come to the front and ordered the extension made. The judgment of his lieutenants, so far as we are able to learn, has been invariably correct and it is safe to say that there are few feed lines along the main transcontinental roads controlled by Mr. Harriman which are not earning something for the bond and stockholders. It has been a source of great surprise to those who have studied his work in the west to learn that the government has attempted to curtail the development of this system. In large organizations of this kind there are, no doubt, many mistakes made, overambition on the part of lieutenants or sub-lieutenants sometimes leads to criticism which is laid wholly on the head of the system.

It is the opinion of the editor of this journal that Mr. Harriman would not sanction or countenance any move which would be detrimental to the country at large or to individuals who are supporting and helping to build up this vast western country.

There are many who criticise both Messrs. Harriman and Hill, but this is due mainly to selfish prejudice or lack of information concerning the necessities of the west and its great possibilities. It is safe to say that no two men of this decade have done more to develop the great west than these men and their critics should give this fact due consideration.

Irrigation: "Something Better."

It is perhaps enough to say of irrigation that whoever once engages in irrigated agriculture or horticulture does not return to the eastern or middle west farm with its crop uncertainties and often meager returns. System is absolutely essential on any farm, east or west, for the best success. It is indispensable in irrigation. The irrigated farm is often likened to a factory, producing a given quantity of marketable product in a given time without likelihood of serious variation. It must have the same pains-taking management as the factory.

The business man, trained to the systematic management of affairs, finds in irrigation the opportunity for an attractive outdoor life without the sacrifice of

business activity or the emoluments to which he feels his talents entitle him. Good management is such an essential part of successful agriculture under irrigation that, though his acres be few, the owner of a ranch may employ his time profitably in overseeing the work rather than in bending his back to the toil of the field. He may find plenty to do in planning his crops, directing the work and marketing his produce.

On the other hand, a ranchman devoting himself single-handed to some such specialty as clover seed, sheep or hogs fed on alfalfa of his own growing, with a little grain from his own fields to balance the ration, can perform prodigious tasks and reap a munificent reward at selling time. The variety of crops that may be grown and the multitude of things that may be done with an irrigated farm to bring in a profit, supply the longing of people with widely different tastes. Even the man or woman with an acre or two may have poultry and small fruits and win a profit by carefully directed industry and intelligent marketing.

Such facts as these are becoming more and more patent to tradespeople and professional men who find the routine of their work irksome and nerve-racking. Agriculture in all its branches now calls for scientific knowledge. The old way has given place to a new and better way, which under irrigation is a sure way. The ambitious man finds in irrigated agriculture a field for his ambitions. If one's real object is a home and a living for his family, he may place himself beyond the reach of competition upon an irrigated ranch. Under the easy payment plan generally in vogue in newly irrigated regions the man of small means has his opportunity. By making a careful choice of location, buying where the soil and climate are good and the water supply abundant, dealing only with responsible people, success is almost certain to follow his venture.

Unfortunately the splendid results which follow intelligent irrigation have attracted the fly-by-night class who inhabit the business world. These vampires take advantage of the eagerness of people to acquire irrigated farms. They offer as irrigated land those tracts usually which lie close to well known irrigated districts, though the possibility of watering them may be entirely hopeless. It is regrettable that this warning is necessary, but pick pockets go with the crowd, and the presence of those who would profit unworthily serves to emphasize the great strides which irrigation is making. There is still plenty of room in the irrigation band wagon and whoever gets aboard is assuredly on the way to prosperity.

"The Best."

The signing of the Reclamation Act by President Roosevelt on June 17, 1902, not only started the Government machinery upon irrigation works of great magnitude, but gave new courage to private enterprise. In many instances private capital has outstripped the Government in the success of its undertakings. We do not have to go far for the reason. Uncle Sam is a poor business man. He always has been. His chief quality is determination. He generally accomplishes what he starts out to do, cost what it may. So he builds irrigating systems and, sooner or later, generally later, gets them done. The land under the system pays the price, no matter what it may be.

A great error was committed in attempting to apply an old law to new conditions. The Homestead law has been made to apply to the settlement of new lands under the irrigating projects of the Government. Failures have resulted in many instances. The writer has the report, at second hand only, that a Government official connected with the Reclamation Service has confessed to a general feeling in the service that the Government would have to colonize these tracts three times before the settlers would stick. The first settlers are reported moving away from certain projects, having gone to the limit of their endurance of adverse conditions.

The settlement of irrigated lands under the strictly Government projects is not a poor man's proposition, and a well-to-do man will not go in where he must bind himself to five years residence on his land and ten years of payments before patent will be granted him. If the poor man, who may have just enough money to carry him through one season, is disappointed in the delivery of water, as has been the case, he stands to lose all his investment. He cannot leave his land without impairing the title or wholly forfeiting his right to it. Without water he can raise nothing of enough value to compensate him even meagerly for the effort of planting and harvesting. He cannot borrow money on his land for the title is not his until ten years have elapsed. Men of means will not go into the Government zones of irrigation on new lands, because there are opportunities so much better to be had. They do not want to settle among the shacks of a disappointed population. The law does not seem to have enough humanity in it to apply successfully to the conditions that have arisen under Government irrigation. Although a man may improve handsomely his entire farm, still he must live on and on, tied to his property for five years, and then he must complete the payments for the ten years.

The Carey Act, on the other hand, was framed with the new conditions understood and appreciated. The improvement of the land was the first thing sought. While giving a settler an abundance of time in which to get established, it recognized the fact that it is irksome to any man to be tied down for a period of years in one spot. The best of us would grow impatient with such an obligation hanging over us. In most of the states where the Carey Act applies, if a man reclaims one-eighth of his land by irrigation and planting a useful

crop, and will live on it thirty days with his wife, if married, he may make final proof and secure a patent to his holding. The water contract continues as an obligation, which may be paid up at any time. He must pay his proportion for maintenance, and this requirement is sufficient stimulus to a complete reclamation of his farm.

The rapid development of lands under the Carey Act, the high-class population that has turned to farming under irrigation, the substantial character of improvements, the rapid growth of beautiful towns, all justify the liberality of the Carey law. It would impose no hardship on anyone if equally liberal laws were made to apply under the Reclamation projects of the Government. The fear of letting down the bars has resulted in the imposition of absurd and severe restrictions. The pioneers of early days did not endure more of hardship than have many of the pioneers on the new lands under the Government projects during the last five years. It has been unfortunate that there have been so many changes of administration on the Government irrigation work. It was in the nature of things that many incompetents should be employed, that many promises were made which could not be kept, and that settlers relied on the statements of irresponsible persons connected with the work. The harvest of disappointment has been great and the worries and heart aches innumerable. Big men in the service have been few, notwithstanding it should have demanded the greatest of engineers and the most capable of administrative capacity. Perhaps the service has tried to do too much. The clamor of many communities for the Government to come in and construct great irrigating systems has been listened to, to the detriment of work already undertaken. Any community with an understanding of the history of the reclamation service to date will hesitate long and exhaust other resources before tying up with our Uncle Samuel, much as we venerate him.

Rural Life and Other Things.

Much has been said, during the past year, relative to the life of the farmer. The inquiry started by Mr. Gifford Pinchot, as a part of his advertising work, resulting in the organization of the "Country Life Commission" has aroused in some degree an increased interest in rural problems. A study of farm life when too much localized would lead generally to erroneous conclusions. New England has lost much of its early farming population. The progressive man has always looked to the West and in consequence that territory east of the Allegheny mountains has suffered the most seriously. With the trend of migration westward and toward the cities, the farms have been neglected and a new population has taken the place of the original sturdy stock. New England has felt the effect of this transition for a hundred years. She furnished pioneers for the Mississippi Valley and the great prairies beyond.

New York, Pennsylvania and Ohio now contribute their share toward the settlement of the unoccupied public domain. This movement has already had a marked influence on land values in those states. The farmer who is successful either sells his estate to those who are willing to work as the soil now demands, and removes to a neighboring town, or retains his interest and departs to build a home where his declining years may be spent in peace and contentment. Many of these farmers and more of their sons and daughters go to prairies and mountains of the West. It is seldom that they return to take up permanent residence in the east after one Western experience. The Western boy who secures his education in the East seldom remains there.

This tendency to go West was born in the infancy of the country and it is as strong today as it has been at any time in the history of the nation. It is difficult to understand why whole communities of the East are robbed of their rural population when the lands there are far from being fully developed and when large areas have never yet been disturbed by the plow or reclaimed from their original swamp condition.

Climate alone would be an inducement for the progressive man to go West. A climate favorable to man may not be so favorable to the growth of crops upon which he must depend for subsistence. The West, particularly the inter-mountain region, has shown new phases of agricultural life. Science and agriculture go hand in hand. By controlling the moisture applied to the ground through irrigation, the farmer has been developed into a thinker and he conducts the affairs of the farm from the standpoint of a manager rather than as an individual toiler. This is what appeals to those who desire to improve conditions.

We prophesy that the acme of rural life will be reached in the inter-mountain districts of the West. The topography of the country is such as to give to every individual and to every community an independence that cannot be attained elsewhere. It dwarfs a people to live in a country where one industry predominates. The land of varied resources must be the future home of the greatest men of the race. The mountains and valleys of the West furnish all of the resources known and enjoyed by man. Mineral wealth lies hidden in the depths of every range; coal, oil and gas are found in abundance; the waters of every stream will turn the wheels of all industries; timber for all time grows wherever nature has furnished sufficient moisture; shale and limestone insure an inexhaustible supply of Portland cement; the land produces riches wherever it is cultivated and water is supplied, while the sun shines three hundred days in the year. Add to this such scenery on every hand as the greatest artist cannot imagine in his supreme flights of imagination and we must admit that

the paradise upon earth has been descovered. To be perfect it only needs such minor modifications as will make it a home for man.

The question which should interest us now relates to the methods that are being employed to establish the race firmly in this natural Utopia. We must admit that the fundamental problems to be solved relate to irrigation and the use of water in general. This being true, it would be well for us to ascertain whether or not wise plans have been made for the utilization of this most important resource. A few moments of reflection should satisfy us that ideas for bringing about irrigation development have been sufficiently prolific. We could be as easily convinced, probably, that many of these ideas have been brought forward and put in practice for selfish reasons. We have the individual irrigator to begin with. His land lies along a small stream and he is able to build his own ditch. He is king of all he surveys. It never occurs to him that there are great problems before him or that he must in time share in the responsibility of distributing the water supply in a great irrigated community. Before he has obtained great satisfaction due to his isolation, neighbors settle around him. By and with his consent they make use of his ditch by increasing its section and extending it to cover other lands. Before he is fully aware of the new conditions that have arisen, all kinds of community problems are brought to him. Among these is the questions as to how the community canal should be managed. This means that he must organize with his neighbors to the end that each may pay his proportionate share toward maintainence and impose penalties upon those who refuse or neglect to comply with the rules of the majority.

In the meantime many similar canals are built and other communities come into being. Not satisfied with individual and community effort, capital is induced to invest in large storage works and an extensive canal system which is designed to reclaim a large area of "bench" land. This is so successful, probably from a financial standpoint, that the wily promoter pricks up his ears and looks in the direction of the promised land. He undertakes to perform some financial exercises and outlines plans for large irrigation development, possibly under the provisions of the Carey act. He obtains some documents from the public that enables him to present the project to capitalists. The latter, being more willing to invest money of other people than funds of their own, propose a bond issue. The stock of the company is dealt out to those who promote and their friends. The bonds are sold and construction is begun. It is necessary to pay the interest due each year on the bonds from the money derived from their sale. This means that unless work is pushed rapidly on the irrigation system the capital will all be dissipated before the settler begins to repay the same in return for his proportionate interest in canals and reservoirs. All kinds of schemes are then brought forward to bring in the needed cash for construction. In some cases it is found that the first estimates were too low—in others that the promoters may not have secured any engineering advice. It is seldom that bonds can be sold at this late day except after a favorable engineering report has been obtained. Attempts are sometimes made to dispose of the lands and the relative interests in irrigation works, commonly called "water rights," before construction has been fairly started. The settler, under such conditions, is running some risk. He does not know what kind of irrigation works he is to obtain finally. He does not know whether the money he pays to the company will be used in construction or not. This kind of practice should not be tolerated in any country.

To build anything of value requires capital. No person or association of persons should plan to profit through the expenditure of money, not their own, and take chances that they would not incur with their own funds. There are occasions when a bond issue is of benefit to all concerned in this kind of development work. If the stock is given away and no money returns to the company therefor, the entire development work hinges on the bond issue. The stock should bring enough money into the treasury of the company to carry construction to that point where the security of the bond issue, if an issue is found necessary, is unquestionable.

The larger and well known bond houses carry on their work in a wholly different manner and securities offered by them are based on advice of the best engineers and good construction.

When the promoter has had his day and has been forgotten, the United States Reclamation Service comes along and proposes to do things on even a larger scale. The natives, unused to khaki uniforms, plane tables, slide rules and current meters, stand in awe of this mighty arm of the government service. The papers locally are full of the great plans for the future. The Reclamation Service, through its advertising department, gladly furnishes information for the printer and every detail of the finished irrigation works is known before the first shovelful of earth is turned. Estimates are made as to the final cost of the so-called "water rights." These estimates are generally about twenty to thirty dollars per acre during the early advertising stage of the project. As work progresses the pioneers of the country have an object lesson as to what can be done by the Government. The best kind of construction, only, is countenanced. Steel, masonry and concrete take the place of earth, wood and burlap. The construction is supervised by one responsible man on the ground who has two men under him. These two each have several subordinates. The organization continues to grow in this way to such an extent that the interested observer

usually gives up trying to understand the general system or to appreciate the rank of the various employes. As time runs on, and considerable time is liable to run during the construction of one of these projects, the original estimates of cost are increased. The advertising is also increased, if possible, and the intending settler accumulates years, experience and liabilities while waiting for water. It is a delight to meet any of the agents of the service at any time. They are optimists of the first water and can give more information about the economic and social problems that they are working out than would be expected of one who had made a specialty of these sciences. It is somewhat difficult to obtain much specific information of an engineering character except from the head of the advertising department at Washington, who, to our surprise, is not an engineer. Naturally the cost of management runs high in a government irrigation project. However, the final result must be satisfactory to all concerned and the Reclamation Service is performing a great work.

From all of these agencies some systematic plan should be evolved which would lead to the construction of the best kind of irrigation works at a minimum cost. The social and business problems that have to be solved when the settlers finally take charge of the irrigation works are also of great importance. Let irrigators discuss questions of this kind at the Irrigation Congress. Let us unite every interest that seeks to encourage the growth of agriculture and the future of the race, in a movement that will discourage the man who comes to the congress to advertise himself and his policies. The tendency has been to favor politicians, red fire and generalities and to drift away from the fundamental problems upon the proper solution of which the future of the West largely depends. If we have a mission, let us perform it—if we have none, let us discontinue the congress, rather than to employ it as a stage for the grandstand performer. The congress has a responsibility. If the valleys of the Rocky Mountain region are to support the highest type of rural life, a foundation must be laid. The congress can do much to provide this. Those who seek notoriety and who have patent policies of their own to exploit, will soon depart and time spent in assisting them is time lost. Let us consider great questions rather than waste our strength in supporting men of passing importance with their measures of questionable value.

Maxwell Again.

In the Mesa Department of a recent issue of the Arizona Gazette we are informed that George H. Maxwell has recently been in Mesa and has told the people of that town that he will locate 10,000 families in the Salt River Valley within the next five years. He states that to do this will require a great deal of money and work. He does not, however, intend to do it alone but with the aid of the citizens of the valley, whom, he believes, may help him in accomplishing this great end.

This is a very laudable ambition on the part of Mr. Maxwell and is entitled to all the encouragement which the people of the Salt River Valley may give him.

There are some facts, however, in connection with his project which makes it appear impossible. He proposes to organize a company, called the Homecroft Company, whose object will be to get the people from the crowded cities to locate on farms where they will be able to make themselves self-supporting and more independent than in the crowded tenements of the large cities. Mr. Maxwell, it is stated, will make his headquarters in Chicago, where he believes there are thousands of people who would gladly go on a piece of ground if an opportunity to do so is presented to them.

Like many other of Mr. Maxwell's past efforts, however, we note he wants ten of the leading citizens of Mesa to take stock in his Homecroft Company at $100 each, which would mean $10,000 for Mr. Maxwell. He only asks $50 down, and informs the people that each $100 invested in preferred stock would draw 6 per cent interest, which would make it a safe investment. Mr. Maxwell fails, however,, to inform the people of Mesa how stock in his Homecroft Company would be made to pay 10 per cent. He states that he would use this money to aid Mesa, furnish a room in Chicago to display advertising, fruits and other products, so that people would have a chance to see just what that country produces.

While, as stated above, Mr. Maxwell's ambition is laudable, and may result in some good for the Salt River Valley, it is our impression that ten thousand dollars will not go very far toward locating ten thousand families in the Salt River Valley. All good colonization agents throughout the country estimate that it costs from three to five dollars per acre to properly colonize virgin land. Mr. Maxwell's project with 10,000 families, which would represent possibly 50,000 people, counting five to a family, would mean that he could put these people on the land at an expense to the people of Mesa of about ten cents per head. It is our opinion that Mr. Maxwell should go into this matter more carefully and organize along safer lines.

THE IRRIGATION AGE would be very glad, indeed, to assist him in an enterprise of this kind, but it should be carefully studied out in advance and an exact estimate made of the cost to locate an individual or family. There are so many ramifications to a proposition of this kind that it should be well and carefully figured out. On the other hand, it seems to THE IRRIGATION AGE, that a guarantee of ten per cent to some of the leading citizens of Mesa and other towns of the valley is entirely uncalled for, in view of the fact that the leading citizens of the valley are usually large land holders

and will be sufficiently benefited by a move of this kind, to make it worth their while to put up that money without any guarantee of return.

THE IRRIGATION AGE has found occasion at various times to criticise Mr. Maxwell and his methods, but as suggested in preceding lines, it would be very glad, indeed, to work in conjunction with him, and assist him in any way possible in this enterprise. Any method which leads to the bringing out from the crowded, unhealthy conditions in the tenement districts, families who could make good under favorable conditions is entitled to the support of all of us, and we wish Mr. Maxwell much success in his undertaking.

Development in Washington.

More than 100,000 acres of land, exclusive of government projects, will be added to the irrigated area in eastern and north central Washington this year, and arrangements are also under way to put water on thousands of acres of land in northern Idaho and Oregon, western Montana and southeastern British Columbia. As most of these lands will be devoted to apples, peaches, pears and plums, it is estimated that from 7,000,000 to 10,000,000 trees will be planted during the next fourteen months, giving employment to hundreds of men in various parts of the Inland Empire this spring, next fall and the spring of 1910.

Reports are also current in Spokane that the federal government will take up the Benton and Kittitas projects, 877,800 acres, in Yakima, Klickitat and Benton counties, already reported upon by the Reclamation Service, and it is believed that the Palouse projects, 100,000 acres, abandoned by the Reclamation Service because of the lack of funds, will receive attention this year. Other government works in Washington to be taken up include 50,000 acres in the Ellensburg district, 200,000 acres in the Rattlesnake and Coal Creek districts and 100,000 acres in the Okanogan country.

The government will in time have reclaimed 1,500,000 acres of wholly or partly waste lands in the state of Washington at an estimated cost of $50,000,000, which is prorated among the owners of the land where water is used. The projects in operation and under construction by the Reclamation Service include these works in the Yakima valley: Sunnyside, 90,000 acres, to cost $1,600,000; the Tieton, 30,000 acres, costing $1,500,000, and the Wapato, 120,000 acres, to be completed at a cost of $1,500,000.

Send $2.50 for The Irrigation Age one year and The Primer of Irrigation

EDITORIAL NOTES.

BY G. L. SHUMWAY,
Executive Chairman, American Irrigation Federation.

After the National Irrigation Congress held at Portland, Ore., in 1906, there was an evident need of a national organization to aid all deserving irrigation plans; a tribunal of appeal (albeit without legal powers), to adjudicate, if any existed, the relative justice of contending claims, and to advise settlements of disputes to the end that the home-maker suffers no injustice, and that the development of the west be pushed on toward its ultimate goal. As a result of a preliminary conference at Portland, representatives from several states met at Omaha, Neb., on January 10, 1907, where the American Irrigation Federation was born.

The declaration of principles which were then and there given out were in harmony with the expressions and opinions of leading irrigators of practically all the western states, and are as follows:

First—To endeavor to harmonize conflicting interests.
Second—To counsel with federal authorities and private enterprise relative to determining their respective priorities and privileges.
Third—To promote essential legislation, propose laws to encourage irrigation development, and to perfect those already on the statutes.
Fourth—To circulate instructive irrigation literature, and exploit best methods of irrigation farming.
Fifth—To aid in the settlement of the newly reclaimed areas.
Sixth—To accomplish as quickly as possible the reclamation of the greatest available acreage, and peopling it with the most desirable, intelligent and progressive citizenship possible to obtain.
Seventh—To fearlessly criticise the reclamation officials, or private promoters, should they offend our sense of justice.
Eighth—To aid in the adjustment of freight rates to and from new areas, and to recommend the establishment of mills and factories where needed.
Ninth—To accomplish by criticism and suggestion increased efficiency and perfection of the national irrigation act.
Tenth—To invite friendly discussion and earnest cooperation in efforts to perfect the reclamation service and prevent errors and waste that must eventually be borne by water users.
Eleventh—To preserve the rights of the pioneers of irrigation against unjust aggression and confiscation.

It will be seen by the foregoing that the purpose was to promote the interests of the greater West, and was not intended to hamper legitimate enterprise in any way, yet there were those whose interests were of such a precarious and unjust a nature that they found fault with the proceedings. Some of the reclamation officials also imagined for a time that this organization contained some kind of a veiled threat or menace to government irrigation. This illusion we now believe has been happily dissolved.

At the Omaha meeting an executive committee was selected, consisting of C. G. Rowley, Jackson, Mich.; John M. McAlpine, Duluth, Minn.; Zera Snow, Portland, Ore.; C. M. Heintze, Los Angeles, Cal.; ex-Governor Frank Hunt, Boise, Idaho; L. M. Wilcox, Denver, Colo., and the writer of this as chairman. Since then, C. M. Heintze and Frank Hunt have been claimed by the grim reaper, and pressing other business caused the resignation of C. G. Rowley, and there has been added to the committee C. E. Brainard, Payette, Idaho, and Jay Turley of Turley, N. M. Three of the members of the present committee were formerly vice-presidents. The present vice-presidents are: Presley E. Horn, Hailey, Idaho; Prof. J. D. Tinsley, Messilla Park, N. M.; Tom Richardson, Portland, Ore.; Judge Cyrus Happy, Spokane, Wash.; Engineer Clarence T. Johnson, Cheyenne, Wyo.; Prof. O. V. P. Stout, Lincoln, Neb.; Prof. F. D. Coburn, Topeka, Kas.; William Hale Thompson, Chicago; John Hall, Lampasses Springs, Tex.; A. J. Cobban, Rhinelander, Wis. One of the first vice-presidents, A. H. Heber, Los Angeles, Cal., has joined Frank Hunt and C. M. Heintze in the Great Outside.

The growth of the institution has been slower than some of us more impetuous members had hoped, but it has made up for that in the good that it has done in crystallizing ideas. It has now among its supporters a number of congressmen and members of the United States senate.

The officers serve without salary, and frequently pay their own expenses on trips that are deemed necessary. The income so far has been expended for postage and stationery, but it is expected at the next annual meeting to effect some alterations, and perhaps put the federation on a more substantial basis. Membership now costs $2.50 per year, which includes one year's subscription to THE IRRIGATION AGE, which is the official organ. Ex-Gov. L. Bradford Prince of Santa Fe, N. M., was the first president and still retains that position, and D. H. Anderson, Chicago, was first elected and still retains the position of secretary.

Recently the federation sent out inquiries along proposed lines for legislation, and the numerous replies were compiled with the following suggestions to congress and the executive committee were a little divided upon some of the questions, but a majority concurred in suggestions herein made.

Favor larger acreage for homesteads in the permanently semi-arid regions. Mondell's bill accomplished this.

Favor extending communtation privilege to homesteaders under feleral irrigation projects.

Favor charging costs of federal reservoirs to river and habor, or inland waterways appropriations.

Favor extending provisions of the Carey act to the territories. This has likewise been accomplished.

Favor permitting private enterprise the privilege of acquiring upon a reasonable bases waters impounded by the national government in excess of federal needs for irrigation.

Favor keeping faith with the government on the part of the settlers, and on the part of the government with the settlers; where an estimate has been made of the cost of a project and settlement permitted, that no additional costs for betterments and maintenance be made.

The timber and stone act interrogatory brought out a number of suggestions, but in the main opposed the repeal. One suggestion was given by Mr. Turley: 'Appraisement of lands before purchase, with a clause to revert to the state in which situated if purchasers do not reforest or properly protect the timber and stone thereon. Also proposes making taxes lighter upon the owner who reforests, and heavier upon the one who does so only sufficiently to prevent his land from passing to the state.

The American Irrigation Federation will meet at Spokane on August 8th of this year, unless plans are altered, and it is hoped that the attendance will be large, as the date is in harmony with the National Irrigation Congress, and it is then that we trust to listen to the counsels of the best the nation affords as to the work which this institution shall do in the future.

Open to Criticism.

A strong sentiment has developed among those interested in the National Irrigation Congress, concerning the matter of the office of president of that organization being filled by any individual who is interested in a private irrigation project, and it is doubtful if anyone holding a position of that character can ever be elected to fill that office again.

While all of those interested speak in high terms of Mr. Barstow, they feel that as he is interested in an irrigation project which has been very largely exploited through the press, it is unfair to other people engaged in colonization and reclamation work under private control to permit his re-election.

It is safe to say that the next man who fills that position will have no outside interests and will not be open to criticism of this character.

Send $2.50 for The Irrigation

Age one year and

The Primer of Irrigation

Official Call Seventeenth National Irrigation Congress.

To the People of the United States, Greeting:

The Seventeenth National Irrigation Congress will be held in Spokane, Washington, U. S. A., August 9th to 14th, inclusive, 1909.

OBJECTS.

The four great objects of the Congress are to "save the forests, store the floods, reclaim the deserts and make homes on the land."

We aim to demonstrate to the West, the wonderful development possible through irrigation, drainage, forestry, deep waterways, good roads and home-building, and to show to the East the economic importance to the whole country of this development.

MEMBERS.

The personnel of the National Irrigation Congress will be as follows:
The permanent Officers of the Congress.
The President of the United States.
The Vice President of the United States.
The members of the Cabinet.
Members of the United States Senate and House of Representatives.
Governors of States, Territories and Insular Possessions of the United States.
Members of State and Territorial Legislatures.
Ambassadors, Ministers, Consuls and other representatives and delegates from Foreign Nations and Colonies.
Members of State, Territorial and Insular Irrigation and Forestry Commissions.

DELEGATES.

Fifteen Delegates appointed by the Governor of each State or Territory.

Ten Delegates appointed by the Mayor of each city of the United States of more than twenty-five thousand population.

Five Delegates appointed by the Mayor of each city in the United States of less than twenty-five thousand population.

Five delegates appointed by each Board of County Commissioners or County Supervisors in the United States.

Five Delegates appointed by each National, Interstate or State organization interested in the objects sought by the National Irrigation Congress.

Five Delegates appointed by each State Conservation, Irrigation, Drainage, Forestry, Agricultural or Horticultural Society or Association.

Five Delegates by each State Association of professional, commercial, fraternal, patriotic, religious or labor organization.

Two delegates duly accredited by each Chamber of Commerce, Board of Trade, Immigration Society or Commercial Club.

Two Delegates duly accredited by each regularly organized Irrigation, Agricultural, Horticultural or Forestry Club, Association or Society in the United States.

Two Delegates duly accredited by each Agricultural College, and by each College or University having chairs of hydraulic engineering or forestry in the United States.

Two delegates duly accredited by each regularly organized Society of Engineers in the United States.

MAKE APPOINTMENTS EARLY.

Appointment of Delegates should be made as early as possible, and notice of appointment, with full name, occupation and postoffice address of Delegates, forwarded to the Chairman or Secretary of the Board of Control at Spokane.

FOREIGN REPRESENTATIVES.

All foreign governments, particularly those of the American Continent, have been invited to send representatives to the Congress.

ADDRESSES.

The program will consist of addresses by:
Government Officials of the Reclamation, Forestry and Agricultural Departments.
Statesmen and Scientists.
Railroad and financial magnates.
Promoters of Carey Act reclamation projects.
Officials of private irrigation enterprises.

DISCUSSION.

At the Seventeenth Congress, speakers will be allotted not to exceed twenty minutes on any one subject. Addresses will be followed by general discussion on the part of Delegates, limited to five-minute talks.

It is planned to make this a practical, live Congress for the consideration and discussion of the questions in which the Delegates are interested and whose actions will be of great value in the promotion of the objects for which the Congress is working.

GOVERNOR'S DAY.

The Governor of each State and Territory in the Union, together with his staff, has been invited to be present on Governors' day, for which one day of the Congress will be set apart.

IRRIGATION PROJECTS.

The selection of Spokane was peculiarly fortunate for this Congress, providing, as it does, an opportunity for the study of all methods of irrigation and all systems of irrigation projects.

Within a few minutes' car ride of the city itself are to be found gravity canal systems, pipe distribution of water and the latest electrial pumping plants.

In Idaho, Montana,, Oregon and Washington the large irrigated areas produce both products of Southern climates and the perfection of the Red Apple, as demonstrated at the first annual National Apple Show held in Spokane in December, 1908.

EXPERIMENTAL DEMONSTRATION FARM.

The Department of Agriculture has taken charge of a plot of twenty acres on the outskirts of Spokane, where will be demonstrated the most approved methods of applying water.

This will be in charge of irrigation experts, who will gladly supply all information to visitors, and no expense will be spared in making it a very valuable adjunct to the meeting of the Irrigation Congress.

RAILWAY RATES.

Special railway rates will be made for Delegates to the Congress over all Trans-Continental Lines, with stopover privileges at all Western points.

Delegates should notice particularly that they can avail themselves of an opportunity to visit the Alaska-Yukon-Pacific Exposition, the Yellowstone National Park and many other points of national interest, with no extra expense, by purchasing tickets to the Pacific Coast, stopping off at Spokane for the Irrigation Congress and subsequently visiting irrigation districts en route, arrangements being already made in different localities to properly receive them.

INFORMATION.

Information relative to the Seventeenth National Irrigation Congress, program, rates, hotels and other data will be furnished upon request from the Irrigation Congress Headquarters, Spokane, Washington.

During the time of the Congress an Information Bureau will be conveniently located for the benefit and accommodation of delegates and visitors, and every endeavor will be made to give them the best attention and accommodation.

Spokane, Washington, U. S. A., March 1, 1909.

THE SEVENTEENTH NATIONAL IRRIGATION CONGRESS,
By George E. Barstow, President.
B. A. Fowler, Secretary.

THE BOARD OF CONTROL,
W. A. Beard,
Chairman Executive Committee.
By R. Insinger, Chairman.
Arthur Hooker, Secretary.

The Seventeenth National Irrigation Congress

To Be Held at Spokane, Washington, Aug. 9-14, 1909

Preparation Is Being Made to Entertain the Largest Gathering in the History of This Organization

BY AUGUST WOLF

The National Irrigation Congress recognized the importance of the Inland Empire as a fruit-producing district when it was decided to have the seventeenth session in Spokane the week of August 9, when President Taft and several members of his cabinet, government officials, members of congress, governors, foreign

Old Hudson Post, near Spokane.

representatives, railroad presidents, bankers and delegates from various states and territories and provinces in Canada will participate in the deliberations. The purpose is to demonstrate the wonderful development to the west possible through irrigation, drainage, forestry,

First House in Spokane.

deep waterways, good roads and home-building, and to show to the East the economic importance and benefit to the whole country of this development, which includes the saving of forests, storing of flood waters, reclamation of the deserts and making homes on lands where the foot of man has not trod for hundreds of years.

The national officers of the 1909 congress are: President, George E. Barstow, Barstow, Tex.; secretary, B. A. Fowler, Phoenix, Ariz.; assistant secretary, F. H. Griswold, Chicago. Every state and territory in the Union has a vice-president.

When it was officially announced that Spokane had been selected for the 1909 congress a committee of bankers and business men appointed a local board of control, headed by R. Insinger, manager of the Northwestern and Pacific Hypotheekbank, with Arthur Hooker as secretary, others being:

Edwin T. Coman, president Exchange National

Spokane Indian Tepee.

bank; George S. Brooke, president Fidelity National bank; R. Lewis Rutter, secretary and manager Spokane and Eastern Trust Company; W. D. Vincent, cashier Old National bank; J. J. Browne, president Columbia Investment Company; A. F. McClaine, vice-president Traders' National bank; W. H. Cowles, owner and publisher The Spokesman-Review; F. A. Blackwell, president Idaho and Washington Northern Railway Company; Jay P. Graves, president Spokane & Inland Empire Electric Railway system; D. C. Corbin, president Spokane International Railway Company; D. L. Huntington, first vice-president and general manager Washington Water Power Company; M. E. Hay, governor state of Washington; J. P. McGoldrick, president McGoldrick Lumber Company; J. T. Humbird, general

manager Humbird Lumber Company; David Brown, president Hazelwood Company, Limited; C. M. Fassett, metallurgist; John A. Finch, L. W. Hutton, August Paulsen and Patrick Clark, capitalists; H. L. Moody, manager Moody Land Company; Cyrus Happy, chief

View on Newman Lake, 17 Miles from Spokane.

counsel Spokane Canal Company; Frederick E. Goodall, president Chamber of Commerce; Robert B. Paterson, president Spokane Dry Goods Company; Fred H. Mason, president Holley-Mason Hardware Company.

The executive committee is composed of Mr. Insinger, chairman, and Messrs. Coman, Moody, Fassett, Rutter, McGoldrick and Vincent.

Mr. Insinger has received letters from every state and territory in the Union, Canada, Europe, the Latin republics and China and Japan; advices now to hand indicate there will be approximately 3,500 accredited delegates, besides several thousand visitors. Plans already outlined for approval by the national officers will limit the speakers to 20 minutes, while delegates will be limited to five minutes in discussion. One of the outdoor features will be a demonstration by the federal department of agriculture of the most approved method of applying water on a 20-acre tract of land on the outskirts of Spokane.

There will also be an industrial parade, with representatives of Indian tribes in the Northwest on cayuses, threshing machines and automobiles and smart traps; also a march in review by the Irrigation army of 10,000 men, the singing of the Irrigation Ode by a chorus of 1,000 voices and concerts by massed bands from various parts of the Northwest. One day of the congress has been set aside for the governors and their staffs, and there will be several receptions, banquets, excursions and theater parties.

"The selection of Spokane this year was peculiarly fortunate for the seventeenth congress," said Mr. Insinger, "as it provides ample opportunity for the study of the various methods of irrigation. Within a few min-

River Road, Spokane.

utes' ride of Spokane are in operation gravity canal systems, water distribution by pipes and the most modern electrical pumping plants, while within a radius of 150 miles are some of the greatest projects ever attempted on the continent.

"That the irrigated districts in Washington, Idaho, Oregon and Montana produce the king of fruit to perfection in color, size, flavor and quantity was demonstrated at the first National Apple Show in Spokane last December, when more than 6,000,000 apples, including exhibits from British Columbia, Ontario, New Mexico, Georgia and other states were entered in competition for premiums aggregating $35,000.

"We have been assured the hearty co-operation and assistance of the forestry and reclamation services, as well as the Department of Agriculture itself, and with the natural activity of the people in the Northwest and in other parts of the country, where irrigation is profitably and successfully practiced, we expect to make a congress which shall eclipse anything yet attempted by the association.

"President Barstow, who has just closed an interesting campaign in the middle western states, writes that we may look for a representative delegation of financiers and business men from Chicago and other cities within the commercial zone of that center. We are also assured of large delegations from Kansas, New Mexico, Texas, Utah, Colorado, the Dakotas, Wyoming, Montana, Nebraska, Arizona, Nevada, California, Oregon, Idaho and Washington, also Canada, where in the western provinces irrigation promises to become a factor, and we look for delegates from southern, eastern and middle western states, who are interested in forestry, deep waterways, good roads, reclamation of swamp lands and home-building."

Prosperity and contentment are the words which best describe the marvelous achievements in the Inland Empire of the Northwest, where the pioneers and those who followed have, within the last few years, wrested from the sage-brush country, long looked upon as absolutely worthless, a crop-producing, home-supporting area of inexhaustible fertility, greater in extent than

Box Canyon, Pend d'Oreille River.

all the cultivated lands in New England and capable of supporting a larger rural population.

Out of the arid waste sprung wonderful orchards, vineyards, berry fields, truck gardens and fields of golden grain and waving grasses; towns and villages peopled with a happy and optimistic population, comfortable homes in the country inhabited by a satisfied yet energetic husbandry; banks, literally bulging with the wealth of their depositors, and railroads and commercial and industrial enterprises telling of the march of progress into what was the desert wilds less than two decades ago.

This wonderful transformation is due to irrigation, the science of supplying moisture, bringing to the soil the waters from streams which constantly corrode the mountains and foothills, giving out the new life principles in the form of alluvium from the decaying rocks and vegetation of the uplands.

The economic value of irrigation, whether by national project or private enterprise, cannot be measured in dollars and cents. It is no longer an experiment in this growing country; it is a confirmed success from commercial and financial viewpoints, and the influence of its far-reaching horizons and its true perspective are potential in character—molding and building. There is inspiration in the vastness of this westerness, where men and women and children breathe optimism and grow mental

Terminal Station, Spokane.

breadth and strength in contemplating scenery, declared by seasoned travelers to have no counterpart in the world. The development of the country will provide a safety valve against the impending dangers of congestion in the cities of the East.

It has been demonstrated that under irrigation western land will produce paying crops of anything which grows in the temperate zone. The products are noted for their brilliant coloring, unusual size and excellent flavor, and they command the markets of the world. Vegetables in almost endless variety and the choicest vine and tree fruits follow each other in rota-

Spokane Club, Spokane.

tion and fill out the season. There is courage born of conviction and fostered by hope in the super-abundant life which springs from the broad desert when moisture is applied and this gives a constant inspiration to industry and stimulus to greater things.

View of Hayden Lake, 18 Miles from Spokane.

Five to 10 acres of land in the irrigated districts will provide shelter, food and raiment for a family and enable its owner to put aside from $500 to $1,000 a year. Scores of hundreds of men and women, many of whom came from the crowded cities in the East and South, are doing that much or better today. The home-making instinct, characteristic of the true American, won out and as a result they are independent and able to dictate the prices of their products.

Farming in the Big Bend Country.

Bowl and Pitcher Rapids, Spokane River, 9 miles from Spokane.

The Government of the United States recognized the possibilities of the lands in the Northwest, where

its projects cover nearly a million acres. The largest of these in Washington is the Sunnyside Project, in the Yakima Valley, 90,000 acres, to be completed at an estimated cost of $1,600,000. Others are the Tieton, in the Yakima Valley, 30,000 acres, cost $1,500,000; the Wapato, 120,000 acres, cost $1,500,000, and the Okanogan, 8,000 acres, cost $500,000.

In addition to these, the United States Reclamation Service has authorized the Kittitas and Benton projects in Washington. The Indian and Reclamation Service estimate that $25 or less will cover the cost for water right on the reservation. This is about half the cost of the watering land under other canals in the Yakima Valley.

Ranch House in Colville Valley, Washington.

It is likely that in time more than $50,000,000 will be expended by the Reclamation Service in the state of Washington in reclaiming 1,500,000 acres of land now entirely or partly waste. Of this, 50,000 acres will be in the Ellensburg district, 200,000 acres in the Rattlesnake and Coal Creek districts, and 10,000 acres in the valley of the Okanogan.

The Government's projects in southern Idaho are the Minedoka, with an area of 160,000 acres, to be completed at an estimated cost of $4,000,000, and the Payette-Boise, 200,000 acres, costing $3,000,000, while Oregon has the Umatilla Project, 18,000 acres, costing $1,100,000, and the Klamath, part of which extends into California, 120,000 acres, cost $3,600,000. The projects in Montana are the Huntley, 30,000 acres, cost $900,000; the Milk River, including Saint Mary, 30,000 acres, cost $1,200,000, and the Sun River, 16,000 acres, costing $500,000. The Lower Yellowstone Project in Montana and North Dakota takes in 66,000 acres and will cost $2,700,000.

Spokane After the Fire in 1889.

Two hundred private projects are in operation in the Inland Empire. The most important of these is at Wenatchee, Chelan county, Wash., which district carried off the first honors at the National Apple Show in

Spokane last December. Unimproved land under the ditch ranges in cost from $400 to $1,000 an acre, according to location, while tracts with bearing orchards bring from $1,500 to $2,500 an acre. Numerous irrigation canals have been constructed in Chelan county, which has three valleys, the Wenatchee, Chelan and Entiat, and by virtue of the size and quality of its fruits the Wenatchee Valley has received the designation "The Home of the Big Red Apple."

The Way Apples Grow in the Spokane Country.

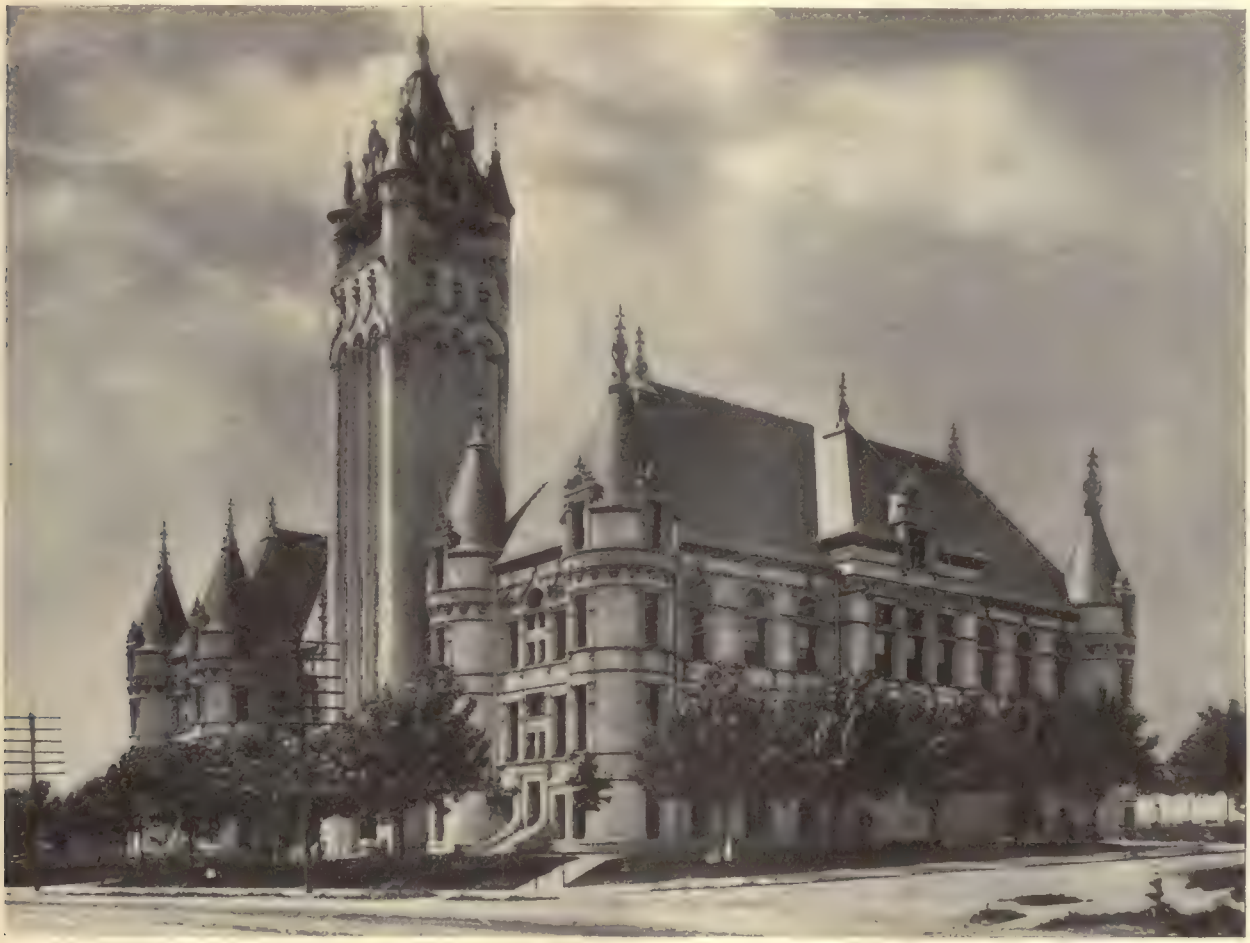
There are also important works in the Spokane Valley, where 20 acres of land has been selected by the federal Reclamation Service to demonstrate the value

of scintifically applied moisture on crops during the seveteenth sessions of the National Irrigation Congress at Spokane the second week in August. George E. Barstow of Barstow, Tex., will preside, and there will be 3,000 delegates from all parts of the United States and Canada, Europe, the Latin republics, China and Japan. President Taft and several members of his cabinet, foreign representatives, bankers, railroad presidents and experts in forestry, reclamation work, deep waterways, good roads and home-building are expected to attend.

Eighty thousand acres of land in the Spokane Valley is capable of irrigation. The Spokane River, nearby lakes and an underground stream flowing through the valley are used by these plants, one of which raises the water by means of electric pumps from wells ranging in depth from 97 to 140 feet. The capacity of five pumps is 15,600 gallons a minute, sufficient to water 3,000 acres of land. The success of this project shows that every acre of land in the valley can be irrigated regardless of the supply from river or lakes.

There are scores of gravity, siphon and pumping plants in various parts of Washington, Oregon, Idaho and Montana, and all are successful. The extent of operations on irrigated lands in the Northwest will be better understood when it is known that the value of the apple and other fruit crops in the Inland Empire amounted to $14,000,000 in 1908. It will be $60,000,000 in 1912, by which time several million trees set out in the last two years will come into bearing and others planted between 1903 and 1906 will have reached maturity.

This is only the beginning of the fruit industry in this part of the country, where millions of acres of land, now flecked with the dusty green of sagebrush, is awaiting the refreshing moisture to make it blossom like the proverbial rose. Irrigation will do much more for the growing crops than rain, as the natural element gives nothing except moisture, while the waters diverted from the mountain sides bring with them new fertility. Much of this land, now not worth more than a few dollars an acre, will then readily be salable at from $250 to $500 an acre, according to location and the character of the soil. That is the history of lands in the now famous Yakima, Wenatchee, Spokane, Colville and Snake River Valleys, where the incomes from fruit range from $450 to $2,000 an acre.



Spokane County Court House, Spokane, Washington.

From an architectural viewpoint, Spokane is distinctive; it is unique. Everything is in harmony with the magnificent setting placed by nature. The residents take pride in their homes and grounds and in this they are making examples for the newcomers and future builders. Spokane is hospitable to the visitors within its gates. It is a healthful place and it has few if any rivals in point of climate. It is blessed with the marked seasons, without the discomforts of extremes of cold or of heat. Summer brings no sultry, sleepless nights, nor are there stinging blasts during the winter months. The air is invigorating. There are no drouths or monoto-

nous rainy seasons, the total rainfall in 1908, as reported by the United States weather bureau, being about 19 inches and two and a half inches of snow. The mercury reached 90 or more 23 days during the year, the lowest being 4 degrees below zero. The average temperature for the year was 49 degrees.

Surrounded by mountain ranges in which nestle beautiful lakes, teeming with game fish, and whose forests abound with game, accessible in an hour's ride on steam and electric lines, Spokane offers the dual attraction of the mountain fastness and of the thoroughly cosmopolitan city with schools that are surpassed nowhere in the United States, with numerous churches and opera houses, magnificent public buildings and modern stores and business establishments.

Some of the Cosey Modern Homes in Spokane.

Spokane has been declared by prominent educators to have the best facilities of any city of its size for educating its young. It has three recognized colleges, two high schools, with 1,850 pupils enrolled, and 28 grade brick and stone school houses and a half dozen private institutions. The total registration in 41 schools is 16,485 students with 530 teachers. The board of education has plans for several new structures, including a high school for the north side of the city, now nearly completed, and there are reports that another college is to be established. Spokane has a Y. M. C. A. building costing $200,000, where there is also the Jenkins Institute, endowed by Col. D. P. Jenkins of Spokane. There are 81 church structures, including two cathedrals, ranging in cost from $1,000 to $200,000.

Spokane has an interesting history, which is worthy of recount at this time. The first settlement was made in the summer of 1872, when a handful of sturdy people gathered at the site of the falls. Four years later the first saw and grist mill was erected, the waters of the Spokane falls furnishing the power to turn the old-fashioned wheel. The first banking institution was organized in 1879, in which year the first newspaper was Railway Company entered from the west, and the people decided to incorporate as a town. There were 500 inhabitants at that time. Robert W. Forrest, a native of Pennsylvania, was the first mayor. In that year, 1881, the second flour mill and another newspaper were established, and the town began to take on metropolitan airs, when, in 1882, it was made the permanent county seat. The Great Northern and Union Pacific systems came in 1892-3. Cheney, 16 miles southwest of Spokane, was formerly the county seat.

The first disastrous blaze occurred in 1883, and was followed in the summer of 1889 by a fire which wiped out 30 blocks in the business district. It was the first real test, but the people were undaunted and the work of rebuilding was begun almost as soon as the smoldering ruins cooled. The fire limits were at once extended and the city council adopted and enforced an ordinance,

prohibiting the erection of wooden structures within the boundary established. Thus Spokane escaped the shanty period, which usually follows in the wake of a widespread blaze, and as a result Spokane is today the best built modern city of its size on the continent.

One of the institutions of interest to the newcomers as well as the residents of Spokane is the Chamber of Commerce, which occupies the second floor of the Hutton building, at Washington street and First and Sprague avenues. Frederick E. Goodall is president and Levi Grant Monroe is secretary. The organization has 800 active members, who are working shoulder to shoulder for the upbuilding of the country. The main hall contains beautiful exhibits of the resources of the Spokane country. Thousands of homeseekers and tourists and sightseers by the hundreds have viewed the exhibit and their words of praise of the arrangement and the enterprise of the people of Spokane in maintaining this branch of its general exploitation scheme would fill several pages of this journal. A recent visitor struck the keynote when he wrote these words in the registry book:

"After seeing this exhibit I am ready to believe anything you may tell me about the Spokane country. The Chamber of Commerce is one of the show places in Spokane and should be seen not only by every newcomer into the city and district, but also by every man, woman and child in the city—it constitutes a liberal education in itself."

Much has been written of the derivation of the word Spokane, pronounced "Spo-kan," but little is definitely known. It is believed the word is from the language of the Indians who formerly hunted and fished on what is now the site of the city. Ross Cox, an early writer, says that the chief of the tribe is known as "Illim-Spokane," which means "Son of the Sun." From this and from the nature of the country, being more open and having more sunshine than that of the Colvilles, inhabiting the valleys to the north, or of the Coeur d'Alenes, whose hunting grounds were in the mountains and foothills to the east, the tribal name is interpreted to mean "Children of the Sun."

M. M. Crowley, an early settler, who traded with the Indians for years at what is known as Spokane Bridge, east of the city, and through whose influence the Spokane Indians were prevented from joining with Chief Joseph of the Nez Perce tribe in a war of extermination against the settlers of the Spokane Valley, says Spokane is pronounced "Spokan" by the Indians and means "wheat," and that literal interpretition is "the man who lives in the country which grows the wheat," to distinguish them from the Colvilles, Coeur d'Alenes, Nez Perces and other tribes who inhabited the districts in which wild game abounded. They also have a

Riverside Avenue, Spokane.

word pronounced "Spo-kan-ee," which means "the sun." From the words "Spokan" and "Spo-kan-ee," the early settlers evolved the name Spokane, which was given afterward to the Indians as a tribal name. The original tribal name of the Spokane Indians is "Sin-co-mahn-nah," meaning of which has long been lost.

Spokane, gateway of the Pacific Northwest and metropolis of Inland Empire, embracing 150,000 square miles in eastern Washington, northern Idaho, western Montana, northeastern Oregon and southeastern British Columbia, where the National Irrigation Congress will hold its seventeenth sessions, may well be called a city of strategic position and power. It is the commercial, financial and industrial hub of the district, and is easily the greatest railroad center west of the Missouri River. It is the keystone in the arch of states spanning the western country between the Rocky Mountains and the Pacific slope, as well as the pivotal point of the vast territory which gives it name.

Fishing and Hunting within and near the City Limits of Spokane.

Broad-minded liberality in planning, together with daring, foresight, enterprise and energy, and patience and thoroughness in execution, are the factors which entered into the making of the Spokane of today and the upbuilding of the country, declared by seasoned travelers and economists to be without a rival in the world. Entrenched in prosperity and fortified with the treasures of forests, mines, fields, ranges and orchards and the swiftly developing country tributary to it, Spokane is destined to become one of the chief distributing points of the Northwest; and, in fact, there are already more than surface indications that it will gain recognition as a converting center in a very few years.

Spokane is not dependent upon any one industry in the veritable empire tributary to it. It will always have many, due to the fact that raw materials in quantity, quality and variety are all within 150 miles of its doors, and with the development of the industries under way and others projected, its population of 120,000 today will be near the 500,000 mark in less than two decades. This is an ultra-conservative statement. Hundreds of others, who have watched the growth of the city, believe that the half-million point will be reached before the close of 1920. When that figure is realized the district will have a total population of between 2,500,000 and 3,000,000, as against 543,710 now.

Tributary to Spokane is the greatest timber belt in the Union and this includes the largest stand of white pine left intact on this continent. Within the same limits are the richest silver-lead mines in the world, comprising the famous Coeur d'Alenes, which produce 40 per cent of the lead output in the United States, in the Boundary country and northeastern and central Washington, as well as in eastern Oregon and western Montana. South and west, east and north are stretches of agricultural lands, including orchards, more extensive and productive than in many of the famed states east of the Rocky Mountains, under existing conditions, with the country sparsely settled, the wealth-production in 1908, exclusive of manufactures and imports, was $145,410,000, or $267 per capita of an estimated population of 543,710. This is equivalent to $1,200 for the average family and from 100 to 150 per cent higher than the general average in the United States, including the wealth produced by manufactured and imported articles. The statistics as compiled by the Spokane Chamber of Commerce follow:

Mineral	$40,000,000
Wheat	36,160,000
Lumber cut, 1,250,000,000 feet	18,000,000
Live stock and poultry	16,000,000
Apples and other fruit	14,000,000
Farm and garden	15,250,000
Dairy	6,000,000

This is the keynote to the situation in the heart of the Inland Empire, where a city of 120,000, declared

to be the best built and most modern on the continent, has been established in less than 30 years. Most of this has been accomplished in the last few years, and there is every indication that it will have a population of 150,000 by the close of 1910. The appended table, showing what was accomplished in 1908 as against 1907, gives an idea of its commercial importance:

	1908.	1907.
Bank clearings	$307,791,482	$301,419,017
Bank deposits, estimated	25,000,000	24,000,000
Building expenditures	5,927,548	5,778,876
City water receipts	321,736	291,743
Transfer property	20,715,405	19,869,832
Postoffice receipts	360,504	302,388
Jobbing trade	24.500,000	24,000,000
Manufacturers, output	17,000,000	16,500,000
Capital invested	13,000,000	12,000,000
Wages paid	4,500,000	4,200,000
Spokane County, taxable property:		
Real estate	15,787,170	14,856,353
Personal	1,518,480	1,352,375
City of Spokane:		
Real estate	53,521,895	32,809,447
Personal	6,595,395	5,427,295
Spokane County, taxable property, about 60 per cent of value	77,422,940	54,445,470
City of Spokane, tax rate:		
	Mills.	Mills.
General fund	7⅛	6⅝
Parks	1	1
Library	⅜	⅝
Interest on bonds	1⅜	3¾
Bridges	⅛	Nil
Sinking fund	Nil	1
Total	10	13
Total for city, county and state	26.5	37

Ninety-eight miles of street railways are in operation in the city and 285 miles of electric lines extend into the suburbs and as far east as Coeur d'Alene and Hayden Lake, Idaho, and south to Palouse and Colfax, Wash., and Moscow, Idaho. There are six transcontinental lines, including the Chicago, Milwaukee & Puget Sound, which is rushing construction work in Washington. There are 12,440 telephones in use and the operating company is 1,500 instruments behind in its orders. A competitive system, with 6,000 instruments, will be in service this year. The city has adequate waterworks, sewerage, lighting, power and park systems.

More than 150,000 horsepower electrical energy is developed in and near Spokane, and there is at least 500,000 horsepower available and undeveloped. The expenditure upon electrical plants and service amounted to $3,000,000 in 1907. The Washington Water Power Company, of which Henry M. Richards is president, announces that $16,000,000 will be expended at the rate of $2,000,000 a year in extending its city and interurban electric railways and light and power plants, and the Spokane & Inland Empire Electric Railway system, headed by Jay P. Graves, also has plans for extensive works in addition to the projects now under way. This company is surveying a line into the Big Bend wheat belt. There are numerous other electric railway projects, one of these being a passenger and freight line from Nighthawk to Brewster, Wash., by the Okanogan Electric Railway Company, headed by Col. Albert M. Dewey of Spokane. This line involves an expenditure of $2,500,000. The Big Bend Transit Company will also build a line to penetrate the Big Bend wheat belt, west of Spokane. This project involves $3,000,000. The Great Northern Company will build a line from Wenatchee to the British Columbia line and the company and the Milwaukee are projecting lines in central Washington, tapping rich mineral and agricultural belts. The North Coast Railway Company, headed by Robert E. Strahorn of Spokane, is building a line from Spokane to the Sound. The Idaho, Washington & Montana Railway Company will extend its line from Newport to Metaline. F. A. Blackwell, president, has disposed of the bonds and work is to be pushed on the 60 miles of road.

Other lines are projected and it may be said there are more miles of railroad lines under construction in this country than in any equal area on the continent, the mileage in Washington alone being 2,500. The present mileage of mail lines, branches, yard tracks and sidings in Washington is 4,595.

Steam lines now in operation in the Spokane country are the Great Northern, Northern Pacific, Chicago, Burlington & Quincy, Spokane Falls & Northern, Spokane International (Canadian Pacific system), Oregon Railroad & Navigation Company (Harriman system), Spokane, Portland & Seattle, Central Washington and the Idaho & Washington Northern.

The growth of the city began with the completion of the first railroad in 1883, and its progress has been substantial and rapid. In less than a decade, from 1881 to 1890, it attained a population, according to federal census, of 19,222, and in 1900 the official count showed 36,842. Conservative estimates in 1906 placed the population at 84,000, and in June, 1907, a postal census, authorized by the city, state and federal governments, gave 77,584 within the city limits, 7,500 in the limits since incorporated and 11,000 employed in railroad and mining camps and making homes in Spokane, thus placing the population at 96,084 at the beginning of July, 1907. The Polk Directory Company announced in March, 1908, that its estimate, at the close of a careful and thorough canvass of the city, placed the population at 108,675, while in the beginning of 1909 the same company estimated the population at more than 121,000.

Fruit-growing is destined to become the chief industry in the Inland Empire of the Northwest and it is not too much to say that the crop of 1912 will be worth $60,000,000, estimated on a conservative basis of the millions of trees which have come into bearing that season. One thing is certain: The production will never be equal to the demand, hence there need be no fears of the lack of markets in the Northwest or elsewhere. Then, too, are the new distributing centers to be opened in England, Germany, France, Australia, the Latin republics and the orient.

Missionary visits by growers in the Spokane country to England, France and Australia last winter demonstrated that Washington apples are in favor; in fact, the first gentleman in Great Britain, His Majesty King Edward, graciously expressed his pleasure and highly commended the fruit sent to Windsor Castle from this

part of the Northwest, while shippers in London and Liverpool made public exhibitions of the consignments sent abroad before and after the first National apple show in Spokane last December, when 6,000,000 apples, most of them grown under irrigation, were gathered together under one roof.

The primary purpose of the show was to encourage the growing of apples not alone in the Pacific Northwest, but all over the continent where the fruit can be raised profitably. The second purpose was to create a demand for high-grade, healthy fruit and to educate the consumer to expect only the best, thus stimulating the growers to place better and cleaner fruit and more of it on the market. The movement was on broad lines and its effect is now being felt, so much so that the preliminary work is already under way for the second National show, early next December, under the direction of Ren H. Rice, secretary and manager.

E. F. Cartier Van Dissel, vice-president and chairman of the board of directors, announces that the next show will be on a more pretentious scale than in 1908, when there were several hundred exhibitors from various parts of the American continent, including New York, North Carolina, Georgia, Arkansas, Oklahoma, Colorado, New Mexico, California, Washington, Oregon, Montana, Idaho, Utah, Prince Edward Island, British Columbia and Ontario, who carried off prizes of a total value of $35,000. Mr. Van Dissel added:

"Three interests were at stake in the show: The apple grower, the public and the apple buyer. All of them were satisfied with the results, which alone stamps the National apple show as a success. From an educational standpoint, unquestionably its most important one, the show was invaluable to growers. It is safe to say that none of the exhibitors or apple growers present ever before came in contact with such magnificent and varied displays of apples, gathered from such a wide territory.

"The East, the South, the Southwest and the Northwest were all represented. Growers were brought into contact with each other and afforded that interchange of ideas which is essential to success. Buyers were present in numbers to get acquainted with the growers and with the merits of the different sections of the country represented. From the standpoint of the public, the show was equally valuable. It gave the thousands of people who attended it a better idea of the apple and encouraged its use as a food. It was the unanimous verdict at the close that the National apple show was a great success and should be repeated, as it will be next December."

For reasons that have never been satisfactorily explained the apple industry has been decreasing rapidly in the districts east of the Rocky Mountains since 1895, and if it were not for the great activity of the growers and the opening of thousands of acres of orchard lands in the western country the people of the United States would be obliged to import the king of fruit. As it is, the entire crop for domestic purposes last year was only 25,000,000 barrels, or a little more than a peck per capita of the population of the United States.

To show the decrease in the production of apples in the Union in the last twelve years, these statistics, compiled by the federal Department of Agriculture, are quoted:

Growers produced 60,540,000 barrels in 1895, and 69,070,000 barrels in 1896, the banner year in the history of the country. There was a decrease of nearly 28,000,000 barrels or more than the entire crop in 1897, when the yield amount to 41,536,000. Another decrease followed in 1898, the yield being placed at 23,570,000 barrels, but in 1899 and 1900, there were substantial increases, placed at 37,560,000 and 47,960,000 barrels, respectively.

There was a drop of 20,890,000 barrels in 1901, while in 1902 there was an increase of 20,655,000 barrels, the crop being estimated at 47,625,000 barrels. Forty-five million barrels of fruit was produced in 1903, and in 1904 the yield was 300,000 barrels greater. Then, in 1905, it dropped to 23,500,000 barrels, and in 1906 it increased to 36,130,000 barrels. The crop of 1907 fell off to 25,000,000 barrels, which was the estimated yield for 1908. The total yield for the 13 years amounts to 559,761,000 barrels, or 1,679,283,000 bushels.

That the decreases in the eastern states have encouraged the growers west of the Rocky mountains is probably best exemplified in the State of Washington, where, according to statistics compiled by F. A. Huntley, commissioner of horticulture, there were growing at the beginning of 1909, 7,677,072 apple, 2,126,222 peach, 1,313,290 pear, 1,238,491 plum and prune, and 938,744 cherry trees, in addition to several million nectarine, quince, almond and English walnut trees. The total acreage, including that used for small fruit, is approximately 227,500 acres. This includes 2,500 acres of grapes, 2,400 acres of raspberriees, 2,000 acres of blackberries, 9,000 acres of strawberries, 675 acres of currants and gooseberries and 350 acres of cranberries, besides thousands of acres of irrigated and nonirrigated lands devoted to melon and garden-truck farming.

A census of the trees on the three leading counties gives the following result at the beginning of 1909:

Yakima—2,115,695 apple, 667,704 pear, 857,300 peach, 179,166 cherry and 24,081 plum and prune trees.

Chelan—1,138,012 apple, 77,407 pear, 338,073 peach, 54,565 cherry and 8,212 plum and prune trees.

Spokane—967,197 apple, 54,707 pear, 154,323 peach, 163,324 cherry and 40,843 plum and prune trees.

The total number of trees planted in the State of Washington in 1908 was 2,067,853, as follows: Apple, 1,169,989; pear, 230,719; peach, 366,731; cherry 190,535; plum and prune, 70,200; miscellaneous, 39,679, and of these 399,553, or 25 per cent of the grand total, were planted in Spokane County, while Yakima County reported 358,477 and Chelan County was third with 301,784.

Experienced fruit growers in the Yakima, Wenatchee and Spokane valleys recommend the planting of one-year-old trees, grown in local nurseries, while others prefer two-year-old trees. The cost of planting in Eastern Washington ranges from 10 to 30 cents each, while the cost of the trees is from $12 to $18 a hundred, according to age, pear trees cost from $20 to $30 a hundred, while cherry trees range in price from $25 to $35 a hundred. The cost of preparing the land for planting ranges from $8 an acre for cropped to $20 an acre for cleared but not broken land.

Send $2.50 for The Irrigation Age 1 year, and the Primer of Irrigation

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WHAT SPRAYING WILL DO.

BY H. E. STIVER.

In the northeastern part of Ohio there resides a well-to-do farmer whom we shall call Smith for convenience, who owns a 40-acre apple orchard, about 30 acres of which are in bearing, and from which he annually receives an income which compares favorably with the salary received by the governor of that state a few years ago. In addition to this, he has about 70 acres of good farm land planted with the usual crops, from which he also derives considerable financial benefit.

When Smith first moved on his place, nearly twenty years ago, there were three trees of Grindstone apples in bearing. Anyone who has had experience with the Grindstone will readily agree that it is rightly named, but it does have several redeeming qualities, chief of which is its facility for storage. At any rate, our farmer, foreseeing that the general yield would be rather poor that year, gave a little attention to the Grindstones and by the next corn planting time discovered that he had realized a net profit of something like seventy-five dollars from them. That set him thinking. He decided that if three trees of such a variety as the Grindstone would bring prices like that, then standard fruit would surely pay more for the trouble of raising.

Then it was that he departed from tradition and commenced to devote some attention to the care of his trees. First he endeavored to discover why the average farmer did not realize more from his orchard, and a short observation convinced him that trees that were not cared for could not produce fruit that was desired by the public. Secondly, came the realization that trees are very similar to the human organism, inasmuch that they must be fed right with properly administered soil, and kept free from disease in order that they produce the best results.

Thirdly, that the only way to benefit tree and fruit was by the elimination of all insects and fungus growths that received nutrition from the tree, and that spraying presented the only successful way of applying the desired remedies.

Fourthly, what was causing the imperfect fruit and what remedy would prevent the cause. His investigations brought forth the fact that the orchard was troubled mainly with apple scab, a disease that attacks the apple itself and stops all growth in the immediate vicinity of the part attacked, causing a hard indented surface and making the apple stunted in that part, and unsightly to the eye. This disease also attacks the leaves. At that time Bordeaux mixture was used to some extent and Smith decided on this for his first experiment.

Please remember that at this time spraying was in its infancy and the man was generally regarded as foolish who would spend good money and time in squirting poison upon his fruit trees when he might be doing something else, at that particularly busy season of the year.

Nevertheless Smith got an inexpensive pump and went to work to find out for himself. He sprayed carefully and painstakingly, watching the progress carefully, and was delighted to note the number of healthy, young apples that grew to maturity, when his efforts were rewarded by greater quantities of larger and more perfect fruit than he had ever expected to procure.

Experience has taught him that the Experiment Stations thoroughly understand how to make the Bordeaux mixture, as their formulas agree with those purchased by his own hard labors, at a time when Experiment Stations were in their embryo stage. So far, the scab has been his main trouble, but a careful spraying always insures a healthy crop free from all disfiguring marks. Since that first year, about seventeen years ago, he had been an ardent advocate of spraying, and three years ago purchased a 1½ h. p. water-cooled gasoline engine sprayer mounted on a wagon with 250-gallon tank. When talking to the writer some time ago, he made the statement that he "would purchase another just like it if this one were destroyed.

Spray pump manufacturers now issue a great deal of interesting and instructive literature on the subject of spraying, and large sums of money are annually expended by them in the exploiting of their pumps. They are always willing to forward catalogues and literature to anyone interested in the subject.

Smith now receives a price very near the dollar mark for his regular apples, and about $1.25 for his fancy grades. In former years (before he sprayed) he considered himself fortunate if he secured 50 to 60 cents per bushel. His success has induced many other farmers in that vicinity to enter in the fruit growing business, so that a large volume of apple business is now coming from that part of Ohio, and commission men who formerly had to be sought after are now attracted to that section, the apples are marketed with no trouble whatever, and the best prevailing prices are secured. All of this business may be attributed to the spraying which Smith started years ago, and without which he would have had neither high grade fruit, in fact, no trees at all.

In spraying he uses proportions of 4 pounds of copper sulphate (blue vitriol) and 4 pounds of quicklime (not air slacked) to 50 gallons of water. The sulphate is suspended in cheesecloth in a barrel of water and after it has been thoroughly dissolved this is poured into another mixing barrel, a bucket at a time, simultaneously with the same quantity of milk of lime, about six bucketsful of each ingredient being of sufficient strength for a tank of 250 gallons. The agitator is then started and the liquid thoroughly stirred up, and then the spraying is started in earnest. Smith's outfit will empty a 250-gallon tank in about three-quarters of an hour. He sprays just before the buds swell, then again when the blossoms are fertile, and again when the blossoms have dropped from the trees.

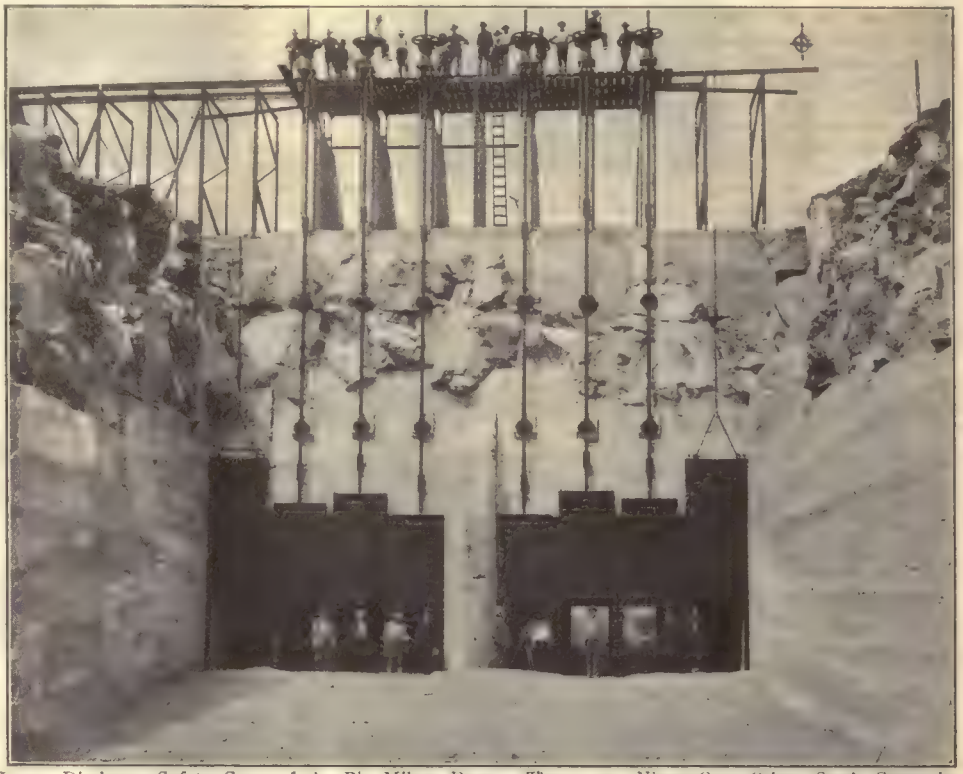
Indications would point that the farmers of today are taking better care of their orchards than those of past generations, and that they are awaking to the fact that it will pay them to watch these same orchards more closely. The amount of fruit annually spoiled by insects and fungus growths is estimated at five hundred million dollars, a sum almost beyond comprehension, and every bit of this wealth could be given to the country every year, if our farmers would wake up to the possibilities within themselves and take care of their orchards, or at least give them a little more care than they do now.

Idaho, "The Gem of the Mountains."

By GEORGE SIMPSON.

The Twin Falls Country, embracing the several large tracts on both sides of the Snake river in Twin Falls and Lincoln Counties, Idaho, is one of the most conspicuous successes under the Carey Irrigation Act; several millions of dollars having been expended on the most elaborate system of irrigating canals to be seen in any country.

A main canal, some sixty-five miles in length, has been built for the tract which lies north of the river, and a system embracing 1,000 miles of main lateral ditches has been constructed. Twenty-five miles of railroad have been built and put in operation connecting the towns of Wendell and Jerome with the main line of the Oregon Short Line at Gooding. The people who have made filings are coming from all parts of the country, even from the Philippines and the Canal Zone at Panama, to occupy and develop the lands.



Lower Discharge Safety Gates of the Big Milner Dam. There are Ninety-One Other Steel Gates in This Dam.

Such is the interest in irrigation and the eagerness of people to buy that the lands are bought and the first payments made, in some cases, two years in advance of the delivery of water. For example, when the Twin Falls Salmon tract was opened for entry, June 1, 1908, announcement was made that there would be no water for irrigation until 1910. Five hundred quarter-sections were placed on the market by the State, yet there was 4,020 applications; the first payment of $3.25 an acre being deposited with each application. The price of this land was $40.50 per acre, payable in twelve yearly installments; the second payment falling due a year after year the delivery of water.

Twin Falls, Idaho.

The Twin Falls North Side tract, which will be brought under the plow in 1909, embraces 180,000 acres. A small part of it was irrigated in 1908, but the great achievement of sending water through 1,000 miles of main laterals will be the crowning event of the Pacific Northwest in the spring of 1909. Each farm of 40 to 160 acres must have its farm equipment the coming season, and each holding must be supplied with its own small system of irrigation as perfect as the larger system which waters the country as a whole.

As reference is made to the larger things, the

mind reverts to the details of this development. Towns must be built and are already in the process of building. Hundreds of farm homes must be constructed and thousands of miles of fencing must be built. Carloads of supplies, literally by the thousand, must be brought from all directions and unloaded in the new country. In the town of Jerome, months before the time for the first irrigation to begin, one may see numerous stores crowded with buyers; hotels and lodging houses overcrowded; and the several lumber yards doing a business that keeps the proprietors on duty every day and far into the night. A water works system has been put in with fire pressure for immediate protection, thus, at once, doing what, in the east, usually requires years of agitation to bring about. Warehouses are being built, schools are already in session and churches have been organized. The season's activity has begun in earnest and, by February and March of this year, every part of the great tract will be alive with its new inhabitants, who will represent every state.

South of the Snake river canyon is the older tract which three seasons of irrigation have transformed from a sagebrush desert to a highly cultivated and productive region. Twenty thousand people are here, and in the town of Twin Falls are nearly 5,000 inhabitants enjoying an uninterrupted prosperity, amid all the luxuries and conveniences that may be found in any eastern city.

Early in 1909, another tract of 40,000 acres, adjoining the North Side, will be opened for entry under the Carey Act, and the inquiries for land are such that the officials believe it will be all filed upon within a few days after the opening. This will be irrigated by extending the main north side canal till it has reached a length of one hundred miles, or more. The town of Bliss, on the main line of the Oregon Short Line, will become a bustling municipality under the influence of this new activity.

Where a Plant is Now Installed Furnishing Power for the Twin Falls Tract, Having 150 Miles of High Transmission Lines. Owned and Operated by the Great Shoshone & Twin Falls Water Power Company.

Three-year-old Apple Tree.

The fertile valleys, the irrigated ranches, the immense orchards of fruit of all kinds, and agricultural products, the great herds of sheep, the marvelous mountains, stored with all the metals, can be seen only by those who have time to tarry awhile between the Rockies and the Blue Mountains.

The modern and important history of Idaho begins properly with the discovery of gold at a point on the Clearwater river in the northern part of the State, in 1860. In re-organizing the territories, in 1867, Montana and a large part of Wyoming were taken from their original limits and Idaho given its present boundary. The steady growth in population led, some twenty years later, to application for admission to the union, and, on July 3, 1890, by proclamation of President Harrison, Idaho passed from a territorial government into statehood, and was heralded as the forty-fifth state to join federal union. Since that time its growth and development has been rapid. Idaho, in its present form, embraces an area of 84,600 square miles, of which 510 square miles are covered by the waters of lakes, and it ranks twelfth in size of the political divisions of the United States.

The general character of the country is mountainous, with a gradual slope from the eastern border of the state, which is defined by the main range of the Rocky

Mountains, to the west. The State is divided by mountain ranges into two great sections, which have a widely different climate. The southern portion of the state lies within what is known as the arid belt, and requires irrigation to produce crops, and for the development of its resources. The Snake river (the largest in Idaho) is the main artery of this great section of country. From its source to the American Falls, the banks of the river are generally low and the fall is rapid, permitting of easy construction of irrigation canals to cover the great benches of fertile land that border the stream through this section. About 100 miles below American Falls the river enters a veritable canyon with precipitous walls of basaltic rock on either side. Some thirty miles below this, the river makes a drop of 134 feet at what is known as Twin Falls. Four miles farther down are the famous Shoshone Falls, with a drop of 210 feet. Eleven miles more and a drop of 139 feet are the Augur Falls. Within a distance of fifteen miles the river makes a straight drop of 483 feet, creating the greatest natural water power in the United States. From a point near Weiser, on to Asotin, the river flows through one of the most remarkable canyons in the United States, comparable only to the grand canyon of the Colorado in grandeur—in some places surpassing it in depth. The elevation of the southern portion of the State is about 2,000 feet, at the western limit, and rises gradually to about 6,000 feet, on the eastern border.

Snake River Above Warm River.

Snake River at St. Anthony, Idaho.

The northern section of the state, commonly known as the "Panhandle," has a pleasant, genial climate, and is blessed with sufficient natural moisture to insure the raising of perfect crops. The northeastern part of the state, and the range dividing the two districts, is very rough and mountainous and nearly all covered with timber. The great Bitter Root range of the Rocky Mountains, with its elevated snow clad peaks, forms the east boundary of this region and gives rise to the great Clearwater river, which cuts its way through the mountain defiles to the west border of the state, where it unites with the Snake river. In this section is found the largest virgin forest of white pine timber that is known in the world. Here are also found millions of acres of pine, fir, cedar, tamarack and hemlock timber awaiting development to supply the world's wants when the timber that is located more accessibly has been exhausted. The eastern boun-

dary of the state is one continual range of mountains, many of the peaks rising above the perpetual snow line; the mountain scenery in this section not being surpassed in any country of the world.

Band of Thoroughbreds, Rexford, Idaho.

This section of Idaho is a natural sanitorium. Anyone spending a year or two in these mountains will receive lasting physical and mental benefit.

Of the agricultural lands, 6,000,000 acres are in the humid belt of the northern districts of the state, lying along streams and in great sections of open prairie country where agriculture is carried on without the aid of irrigation. Nez Perce and Camas Prairie and Palouse country are the greatest wheat sections of the state.

About 5,000,000 acres lies in the irrigated belt of the southern district of the state, which is embraced within the great Snake River valley and its tributaries. The superb climate of Idaho is one of its chief attractions. The varying altitude that obtains throughout the state, provides almost any temperature that may be desired. Commencing with an altitude of about 757 feet, at Lewiston, on the west border, the elevation gradually rises to the east and reaches a height of 10,000 feet at the crest of the mountain range on the eastern border of the state. The average elevation of Idaho is about 4,500 feet. The elevation of the agricultural districts in the humid belt, in the north, is about 2,500 feet, and that of the irrigated section of southwestern Idaho is about 2,400 feet. The elevation of the irrigated land along Snake river is about 3,800 feet. The highest point within the state is Hyndman peak, in Blaine county, which reaches a height of 12,078 feet. The atmosphere in all parts of the state is generally dry. In the higher altitudes of the mountain region the winters are long and the snow falls very heavily, reaching from 7 to 10 feet, on the level, in many places. On the plains of the southern district the winters are like those of the central states, while in the valleys the temperature is very mild and the snowfall light. The thermometer seldom reaches the zero mark in the valleys, and when it does it is an uncommon thing for it to stay cold for more than thirty-six hours.

Al Page, Orchard, on Twin Falls Tract, Idaho. Three Years Old.

There are hot periods, during July and August, lasting three or four days at a time, when the mercury will reach the 100 degree mark, but the atmosphere is so dry that the heat does not become oppressive.

(Continued on page 259.)

The Spokane Hotel

OFFICIAL HEADQUARTERS SEVENTEENTH NATIONAL IRRIGATION CONGRESS.

The Spokane was originally built in 1890 at the time of the big fire. It was purchased by the present owners in 1900, and entirely remodeled, since which time adjacent ground has been acquired and many additional rooms added.

The Spokane today is the largest hotel in the Northwest. It embraces a block of ground 200x150, with a building six stories in height, exclusively devoted to hotel uses. The plant contains 4½ acres of floor space, one acre of which is devoted to the cafes, and the creature comfort of the guests.

In all there are 300 guest chambers in the house, 125 of which have private baths. The rooms devoted to the display of the traveling man's goods, are especially equipped for their business, many of them containing 500 square feet of space, and accommodating very large lines. All sample rooms are equipped with arc lights, running water is in all rooms, so is the telephone.

The lobby faces First avenue, and occupies 4,000 square feet. It is the rendezvous of the city, and glistens with its life and bustle. The parlors on the second floor can accommodate 700 people at a reception. Opening off from the lobby is the Moorish room where 5 o'clock tea is served in the afternoon. This room is an office floor, ladies' parlor, and in the evening is used for a special banquet hall, accommodating 200 guests. Adjoining this room is the Hunters' dining hall, seating 75 people—typical of the chase—with its superb collection of animal heads and its chandeliers and wall fixtures fashioned from elk and deer horns, based with hammered copper shields and trimmings.

But the crowning feature of the house—known as it is as the land mark of comfort in the west—is the silver grill. The old Manor Inn room of England where comfort is written on its walls, and good living appears everywhere. This room is unique. Its praises have been sung everywhere, and it has been copied—or attempted—in many places, but in no copy are the conditions of light and surroundings quite right. The room itself is restful. Its dark brick walls and brick floors, relieved with insertion of Mouravian tiles, the quaint design of the four season frieze above the hand-hewn shelf—the work of a great artist—the low ceilings with their beam network, all hand hewn, working out to the vast dome through which streams the rays of the morning sun, the fountain and rockery of basaltic rock with its wealth of ferns, the singing canaries—part of this room—and then the crowning glory of the great inglenook occupying one end of the room, make a picture blending real art with solid comfort that lives forever in man's memory.

And this fireplace. You walk into it, and around it, and the great logs are burning, and you sit on the settees on each side. Here before the blaze of the hard wood fire, the great barons of beef, or the chestnut-fed turkey are roasted on the old English spits for the delectation of the guest. Inscribed above the fireplace are Owen Meredith's beautiful lines:

"He may live without books, what is knowledge but grieving,
He may live without hope, what is hope but deceiving,
He may live without love, what is passion but pining,
But where is the man that can live without dining?"

And when the beef or turkey is roasted, it is trundled on the solid silver traveling carver—the creation of Christofle of Paris—around to the waiting guests, the delicious appeaser of the gourmand's appetite.

Off from the grill room is a ladies' room, breakfast room, and private dining quarters, and a quaint ladies' reception room, all harmonizing in their decorations with the artistic finish of this attractive touch of old world life in our modern surroundings.

It would be idle to see this great dining department of a Western hotel, without also taking a trip through the cellars of the silver grill. Here the connoisseur of wines lives, and has a being, and it is only truth to say that no wine cellar on the coast excels it, in the holding of vintage wines.

AMERICAN FALLS, IDAHO.

One of the best towns in southern Idaho, a town having unusual natural resources and advantages, is American Falls, Idaho, generally referred to as "the Spokane of Idaho," owing to its great water power, which is twenty thousand horse power greater than that of Spokane Falls.

Two years ago American Falls, which is located in the heart of the great Snake river valley, was little more than a railway station, where the great steel railroad bridge of the Oregon Short Line spans the turbulent waters of the Snake river above the falls. At that time the vast acres of rich soil surrounding the town were utilized as grazing ground for cattle and sheep. But suddenly and unexpectedly a great transformation was effected through the magic wand of water. The American Falls Canal Company, composed of progressive men of brains and foresight, built the American Falls canal, sixty-five miles in length, placing more than 120,000 acres of land under irrigation, a majority of which is directly tributary to American Falls. Then came the homeseekers for government land and filed locations upon thousands and thousands of acres in every direction from the town, which are now being placed under cultivation.

American Falls, the heart of this vast rich territory, soon felt the pulsations of progress and began showing life and growth, not with a "boom," but as a natural result of the demands of the surrounding developments, until today the town has three large general stores, two banks, a $30,000 hotel, modern in every respect, and another 50-room hotel now building to meet the demands, a $20,000 auditorium and opera house, three lumber yards, several large implement concerns, a large flour mill, two newspapers and other manufacturing concerns, also scores of business houses and hundreds of beautiful homes. Shade trees by the hundreds line the streets and cement sidewalks, and the city waterworks is a modern plant in every respect, supplied with water which is unexcelled. A volume could be written in favor of the wonderful springs which supply the city water. Like liquid crystal it bubbles out of the earth, 4,300 gallons a minute in volume, absolutely pure and devoid of any mineral substance or other impurities.

From the stock yards here located many trains of cattle and sheep are annually shipped to the eastern markets, and more than 80,000 sheep are sheared every year at the electric shearing plant located at this point.

Such in brief is the history of a western town which has sprung up like a mushroom and whose future is safe. Located on the main line of a great transcontinental railway system, having one of the greatest water powers in the Northwest, in the very heart of a rich agricultural, cattle and sheep country, with unbounded natural resources and distributing facilities, American Falls is destined to become one of the great manufacturing and distributing centers of the great Northwest.

Hotel Spokane

The Traveling Carver.

View of fireplace in Silver Grill Room.

Views of foremost hostelry in Spokane

The Famous Silver Grill.

Main Lobby.

Director of the United States Reclamation Service, F. H. Newell and a Group of His Able Assistants.

1. Director of the United States Reclamation Service F. H. Newell.
2. A. P. Davis, Chief Engineer, U. S. R. S.
3. H. W. Sanders, Consulting Engineer, U. S. R. S.
4. O. H. Ensign, Chief Electrical Engineer, U. S. R. S.
5. C. J. Blanchard, Statistician, U. S. R. S.
6. Louis C. Hill, Supervising Engineer, Salt River & Yuma Projects; also Strawberry Valley Project, Utah, and Carlsbad, Hondo and Rio Grande Projects, New Mexico.
7. Morris Bien, in charge Land and Legal Division, U. S. R. S.
8. I. W. McConnell, Engineer in Charge, Uncompahgre and Grand Valley Projects, Colo., North Plate, Wyoming and Nebraska, Belle Fourche, S. D., and Garden City, Kansas, Projects.
9. E. T. Perkins, Transportation Agent, U. S. R. S.
10. R. F. Walter, Belle Fourche, S. D., Project.
11. S. B. Robbins, Project Engineer, Sun River, Montana.
12. H. N. Savage, Supervising Engineer, in charge North Dakota, Montana and Northern Wyoming Projects.
13. C. C. Babb, Project Engineer, in charge of Milk River Project, Montana.

"MANLESS LAND FOR LANDLESS MAN."

C J. BLANCHARD, Statistician U. S. Reclamation Service.

There never was a time in our history when the hunger for land was greater than it is at present. The Golden West, with its millions of acres yet untouched by plow, is the Mecca of homeseekers. It is perhaps the last opportunity in this country for the home-builder whose means are limited. Our Nation's greatness has its foundations in the home of the man whose feet are firmly planted on his own land. There is no national stability in a citizenship bred and reared in tenements. Patriotism, loyalty and civic pride are not bred and fostered in the crowded centers of the cities. The destiny of the Nation is overshadowed in the provisions made in the prosperity and attainment of its citizens. An assurance that the great men of our people shall reside in homes of their own is the insurance that our future will be one of stability and progress.

The great need in the present time, as we see it, is for a proper classification of our public domain, in order that reliable information concerning the opportunities for home-builders in all parts of the West may be made public. There is much complaint at the present time that our knowledge of these lands with respect to soil, climate and adaptability to agriculture is so limited that inquirers are not able to secure satisfactory information to enable them to make choice of location. For one hundred years we have been administering the most valuable estate any Nation ever possessed without any appreciation of its value. Our chief purpose apparently has been to get rid of its as quickly as possible without regard to the future when millions of our people will be clamoring for homes. At one time the property of the Nation embraced 1,800,000,000 acres; today it has been reduced to less than 400,000,000 acres.

The remaining public lands occupy two distinct agricultural regions, differing materially in climate, soil and crops. West of the Missouri River lies a vast region extending westward to the foothills of the Rocky Mountains and from the Panhandle of Texas northward into Canada. It is known as the Great Plains. For many years the vast region has been utilized as a public common. Countless cattle and sheep have had free access to it and have overgrazed it. Its administration is still one of the most vexing problems before Congress.

Beyond the Rocky Mountains lies the true desert, a land of mysterious silence; a land of potential greatness, awaiting the magic kiss of canal-borne water to wake to teeming fecundity.

In many parts of it Nature has placed in juxtaposition all the natural elements except rainfall required for a fruitful, prosperous country. Its climate is healthful and salubrious; its valleys and plains possess a soil of inexhaustible fertility, and from the forest-clad mountains, with summits in regions of perpetual snow, countless streams rush downward to both oceans or flow into desert sinks and there evaporate. How to overcome the absence of moisture from the clouds and thus bring the region to its proper state of development is today a problem of paramount importance. Its successful solution will provide a safety valve against the impending danger of congestion in the cities of the East.

The future of our desert empire is, in a measure, predicated by the marvelous achievements of the pioneers. With a courage born of conviction and fostered by the hope which dwells perennial in the breast of the Argonaut of the sage-brush country, they have, within the past few years, wrested from a region long regarded as absolutely worthless, a crop-producing, home-supporting area of inexhaustible fertility, greater in extent than the cultivated lands in Massachusetts, Connecticut, Delaware, New Hampshire, New Jersey, Rhode Island, and Vermont, and capable of supporting a larger rural population. More than $120,000,000 have been expended in irrigation works in the West, and 70,000 miles of canals now carry the life-giving waters to 10,000,000 acres, which each year produce crops valued at more than $250,000,000.

As good American citizens, we owe it to ourselves to extend our knowledge of this splendid country. There is an inspiration in the breadth and vastness of this sleeping empire in the West, and a sublimity in the lofty mountains whose summits are clothed in perpetual snow. One breathes optimism and grows in mental breadth and strength in contemplating scenery which has no counterpart in the world.

The economic value of national irrigation cannot be measured in dollars and cents. The desert made habitable offers the boon of health to him who erects his dwelling upon it. You cannot fix the possibilities of this land of silence and sunshine. We know that the influence of its far-flung horizons and its true perspective are potential in character-molding and building. Instead of the dead level of mediocrity, which prevails in modern city life, the desert offers the uplift of unmeasured distances, the perpetual sunshine, and the individual home, with the broader freedom of action which comes with life in the open. There is a constant inspiration to industry, a stimulation to endeavor, in the superabundant life which springs from the bosom of the desert when water is applied. The transformation which follows irrigation is so remarkable that we are prone to believe Aladdin and his lamp have really appeared.

It is generally conceded that the passage of the National Reclamation Law gave an impetus to irrigation development throughout the arid West. It encouraged private enterprise, and gave stability and value to irrigation bonds as investments. It quickened many enterprises which have languished for years, and promoted the taking up of projects by corporations on a larger scale than ever before attempted. Instead of retarding or restricting legitimate private enterprise, the attitude of the Federal Government has been to step aside in all cases where it was made evident that such corporations undertake and complete the work under plans which would properly protect the people.

Aside from protecting its interests in the works already undertaken or laid out for the future, there has been non interference with corporations or individuals. As a matter of fact few, if any, of the projects taken up by the Service were attractive to private capital.

Those which contain considerable areas of land in private ownership were not approved until practically all of the land owners had made petition to the Government for such construction. The promotion of irrigation works by legitimate corporations has been beneficial to the Government and vice-versa. Large corporations are able to carry on the work of settlement in a manner not permitted by the Government. They conduct a real estate business while the Government does not. All their advertising, however, creates an interest in the country and the reflex benefit is received by the Government. The whole West has benefited greatly by the very wide publicity the press of the country has generously accorded the work of the Reclamation Service. Arid America is no longer "terra incognita." Its resources and opportunities are now more widely known than ever before. The Service is interested not only in exploiting the lands embraced in its projects, it is also directly concerned in the fullest possible development of other areas. Is is from the disposal of such areas that the bulk of money is received with which its work is carried on.

For the past year the Homeseekers' Bureau of the Reclamation Service has been a busy branch of the Washington office. With from 100 to 200 letters of inquiry coming daily from all parts of the world to be answered, the volume of correspondence has been enormous. The majority of these letters require personal replies. It is gratifying to those in charge to know that already 10,000 families have ventured into the West to conquer a new country, largely as a result of this work and the publicity which has been given it.

The landless man has been invited to take up the manless land. Most of those who have accepted the invitation have made that land laugh a harvest. New homes are springing up everywhere in the desert, and a region long given over to sage-brush or buffalo grass is now covered with growing crops. It is a new epoch for our land of silence and sunshine; an epoch of material growth and prosperity, and continuous progress toward higher ideals in agriculture as well as in the life of the people.

A SUCCESSFUL ENTERPRISE.

The French Land & Irrigation Company of French, Colfax county, New Mexico, with general offices at 604 Atwood building, Chicago, have the largest private irrigating enterprise in New Mexico.

They now have practically completed an irrigation system sufficient to thoroughly reclaim over 20,000 acres of land in the famous Antelope valley. Their engineers, Messrs. Field, Fellows & Hinderlider, of Denver, Colo., pronounce this one of the finest irrigation enterprises that have come under their notice, and assure the company that there is no doubt whatever about their having an abundant water supply, and the fact that this enterprise is under the personal supervision of this firm of engineers is sufficient guarantee that the work is thoroughly done.

In addition to the system already in, plans have been made to extend the system over the entire holdings of this company, which include over 50,000 acres of as fertile land as is found anywhere in the country. This company also own the townsite of French, which is rapidly growing and affords unusual opportunities for those seeking to establish a business in a new town that is bound to become the chief trading point of a large and prosperous community.

Their advertisement appears on page 283 of this issue.

The above illustration gives one a good idea of the wholesale way in which farming operations are carried on in the great grain growing regions of the West. The outfit belongs to A. Danicourt of Groton, S. D., and the motive power is a Hart-Parr Gas Tractor. The ground around Groton is comparatively level, and in the fall the roads are ideal for the use of traction engines.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

Southern Pacific
Farming Demonstration Train

"And he hath brought us into this place, and hath given us this land." Deuteronomy 26-9.

Senator Beveridge, in his recent Portland address, said: "Oregon is the grandest country I have ever seen and I have been nearly all over the world. When I retire I am going to buy a little ranch in Oregon and settle down." If he could have accompanied the Southern Pacific demonstration train recently through the Willamette Valley he would surely have made his purchase before leaving for the East in anticipation of the rapid rise in values which will, no doubt, take place as an after-effect of the educational work just completed.

Early in November, 1908, the most elaborate and complete train ever equipped for demonstration work in the United States, left Portland for an eight days' trip throughout the Willamette Valley. The train was in charge of General Freight Agent R. B. Miller, working in conjunction with Dr. James Withycombe, president of the Experiment Station of the Oregon Agricultural College at Corvallis, assisted by eight professors from the institution.

The train was made up of seven cars, as follows: Car No. 1 was occupied by Clara Eva and Lady King, two cows of good family and excellent reputation. Clara Eva, a Jersey, has a record of 530 pounds of butter from 8,733 pounds of milk and Lady King, an Ayrshire, gave 544 pounds of butter from 11,769 pounds of milk. The stalls occupied by the cows were of the latest type in every respect and so simple in construction that most any one could build one. A gasoline engine in one corner operated a compressed air machine to which a milking machine was attached and at each station one of the cows was milked, to the great delight of the school children and apparent amazement of their elders, as there are few opportunities to see these machines in the Valley at present.

Car No. 2 was prepared to accommodate the public in case of bad weather, but there was no occasion to use it during the trip.

Car No. 3 was in charge of Prof. H. D. Scudder, agronomist, and contained illustrations of better methods of farming that could be applied by farmers in the Willamette Valley. Soils of all kinds and how to use them were prominently displayed. One of the most interesting exhibits was the method of seed selection and propagation of same. This illustration alone should save thousands of dollars to the farmers in Oregon.

Car No. 4 was in charge of Prof. A. B. Cordley, entomological expert, and Prof. F. L. Kent, dairy husbandry. Prof. Cordley had illustrations in frames, especially prepared for the trip, showing nearly all the diseases and bad bugs that infect our fruit, also the method of exterminating same so far as known. Prof. Kent had a complete dairy kitchen in his end of the car showing just what a model dairy establishment should consist of.

Car No. 5 was in charge of Prof. C. I. Lewis, horticulturist, assisted by Prof. Cole and Prof. Allen. Here complete information was given on how to raise and pack all kinds of fruit, bud and trim trees and in fact, all subject matter relative to the fruit industry.

Car No. 6, sleeping accommodations for party. Car No. 7, private car California.

The train covered 442 miles during the time and held sessions at twenty-seven towns, meeting and addressing over 25,000 people. Everywhere the merry, bright faced children thronged the train listening eagerly to the talks, viewing with open-eyed astonishment the exhibits and in many instances making a second trip through the train for further information. At every stop the public schools were present, and in nearly every

instance the stores remained closed until the train departed.

It will hardly be necessary for the Government to send a farm commission to the Willamette Valley to investigate conditions, for they would have poor ground to work on. The farmers that visited the train were prosperous looking in every way. They had happy looking wives and children, sleek horses and good wagons and harness, and while they are intelligent, there was evident inclination to know more. Mr. Miller, the official representative of the railroad, told them the purpose of this trip was to make them better farmers so that they would increase their production, thereby making traffic for the railroad.

Dr. Withycombe, usually took for his subject the "Old Red Cow," insisting that her product may be increased both in quantity and quality by selection and testing. He stated that the net return from the dairy products of the average dairy cow in a year is $50.00. The life of an average cow is ten years. Therefore, every cow the farmer "veals" represents a loss to the farmer of $500.

Prof. Scudder and his charts illustrating a soiling crop system for the Valley was surrounded by a crowd from the time the train stopped until it started. This chart told how eight acres of kale will yield 294 tons of feed, with rye, oats, vetch, clover and corn, a soiling crops give 547 tons of continuous green feed, for dairy herds the year around. By using these crops under the Scudder system, fifty cows can be kept on twenty-five acres of Willamette Valley land.

Prof. A. B. Cordley, the entomologist, told the crowds all about the bugs and pests and claims they are a benefit to the grower as the entire elimination of same would produce a condition that would make the growing of perfect fruit so easy the product would be of little value. The professor lost no time, however, in impressing upon the mind of his visitors the bad effect of his numerous pests and bugs and the best known methods of doing away with them.

Prof. F. L. Kent made butter while you waited from the milk of Clara Eva and Lady King, and told how to weed out cows from the dairy herd whose production of butter fat was so low as to make the cows unprofitable. There are thousands of cows in the Wallamette Valley eating more than they produce every day and the simple tests of Prof. Kent will, no doubt, result in an increased shipment of beef to Portland in the near future through the marketing of unproductive dairy cows.

Prof. Lewis, the horticulturist, told his story and clinched it by showing several boxes of Willamette Valley apples of as fine a quality as ever were grown. His system of grafting and pruning, as illustrated by practical examples, was well received and many old orchards will be rejuvenated as opportunity offers as a result of his demonstrations.

One of the most interesting talks given on the train was by C. A. Malbouef, district freight agent for the Southern Pacific, who accompanied the train. He was supplied with a mass of statistics that prove the great development in store for the Willamette Valley.

"There are 5,000,000 acres of fruit lands lying west of the Cascade Mountains in this state," said Mr. Malbouef. "Today there are less than 35,000 acres in bearing orchards. The total shipment of fruit—green, dried and canned, is about 1,500 cars a year. When the present acreage is all in bearing, within the next six or seven years, shipments ought, under ordinary conditions, to multiply tenfold. In the Rogue River section, which is in the highest state of development, particularly in apples and pears, there is yet room to expand the production to the extent of 200 times its present output.

"The Willamette Valley has over 2,000,000 acres of fruit lands, not counting the hill sections. Shipments of fruit are limited, except dried, which amounts to about 20,000,000 pounds a year. But every county in the Valley is setting out fruit, Marion, Lane and Clackamas especially planting pears and cherries, while the berry industry has already assumed large proportions. Markets depend, of course, on the establishment of canneries and the shipment of the fruit green in refrigerator cars. In Washington, berries have been shipped under ice satisfactorily, and cherries safely across the country under refrigeration.

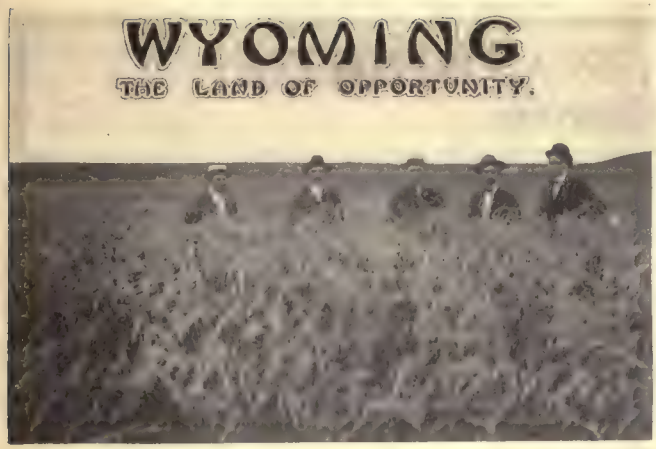
"Prune crops of this state are increasing slowly, the better care and improved markets helping this product along. The recognition of the Oregon prune in the East is increasing so as to justify a much larger production. California ships prunes to the extent of 100,000 tons a year, while Oregon sends away barely 15,000 tons.

"The production of apples in the United States has averaged for the past fifteen years about 250,000 cars. The product is actually decreasing, especially in the Eastern States, while the production of the Pacific Coast is increasing. This coast will be a large future source of supply as far as the higher grades of apples are concerned. Oregon shipped last year a trifle less than 1,000 cars. There should be an increase in shipments of 50 per cent during the next six or seven years, based on the new acreage not yet yielding. After that time, production will depend upon conditions as they exist then. Within eight years from now there ought to be shipped away from this state 10,000 cars of apples a year. Apples grown in the Willamette Valley are just as good as those grown any where when care is given this fruit. The Valley apple possesses great sweetness and in that respect compares with the very best apples grown in the Eastern States.

"Dairy products of the Willamette Valley are also bound to increase to a great extent. During the present year Oregon will turn out dairy products to the value of nearly $20,000,000, nearly all of which come from the Willamette Valley. Washington County, the pioneer in milk condensers, will turn out dairy products worth about $1,000,000. Yamhill is following closely in the steps of her sister county and will soon have three milk condensers in operation. Creamery stations are being established everywhere through the Valley.

"Within the next ten years, it is estimated by competent people who have watched the dairy industry in this Valley closely since it was established, the product of the state in this line alone will be valued annually at not less than $50,000,000, and the fruit interests by that time will be a source of wealth to the state of upwards of $15,000,000 as against the present production of less than $5,000,000."

The benefits to accrue from this trip will be better stock and better methods of cultivation in all lines, the disappearance of hopeless drudgery to be replaced by less work, better education and more money.



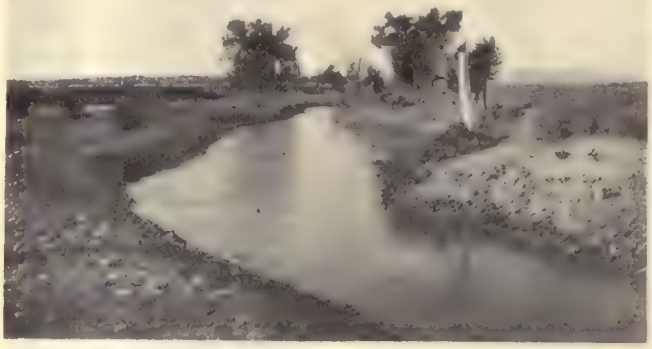
And behold the "Dry Farmer" is abroad in the land and places that were barren now blossom as the rose.

Wyoming invites you to study her resources and her great possibilities for development. For many years the state has been celebrated as a stock country. With a total area of over 63,000,000 acres, with poor transportation facilities until within recent years, it has been a difficult matter to understand fully what the state has to offer the home-seeker and investor. Fully 8,000,000 acres will be ultimately irrigated. Plans are now in progress for the reclamation of over 2,000,000 acres. This land will all be worth from $80 to $200 per acre within the next ten years. When irrigated land can now be bought for from $25 to $50 per acre the investor has every encouragement. Those who are planning to go West should not only understand climatic conditions, quality of soils, proximity of market, the possibility of developing other industries within or adjacent to the agricultural area, the water supply, etc., but all should understand the state laws that apply in any particular line of business. In Wyoming it is impossible to speculate in water. It is the first essential for the protection of the investor in irrigated lands, and the farmer who establishes his home thereon. Water belongs to the land, and the limit of the use is fixed by the extent of beneficial use that is necessary. It is impossible to sell the water right separate from the lands irrigated. This maintains all lands of a community of equal worth, and every tract increases uniformly in value. Opportunities for individual effort in the construction of irrigation works are numerous. Many companies have completed irrigation works and the home-seeker is now invited to come to Wyoming and select his land, for which the state guarantees a permanent water right. The state board of immigration, Cheyenne, Wyo., will furnish many details upon application.

The Creator must have provided the natural scenery of Wyoming to inspire mankind and to lead him to appreciate the beautiful. A camp amid the scenic wonders of the state develops man physically and spiritually.

Every county in Wyoming contains undeveloped resources. All have possibilities for agricultural development. It has been found recently that a large area of land not susceptible of irrigation can be farmed by methods unknown a few years ago. By proper cultivation of the soil moisture that falls in the form of rain and snow can be retained in the ground for the use of plant life. This branch of arid agriculture has been so successful that many hundreds of families have located on lands that were formerly thought to be fit only for grazing herds of cattle and horses and flocks of sheep. The "dry farmer" has been so successful that Congress has recognized him as an important factor in the development of the West, and a law was enacted last winter which enables homesteads to be taken up in tracts of 320 acres. The state board of immigration can furnish information regarding this law and direct intending settlers to localities where such lands are open to entry. Probably 25,000,000 acres will be ultimately farmed in Wyoming in this manner.

Wyoming stands first in the number of sheep raised within the borders of the state. It is still one of the important horse and cattle regions of the nation. All stock business has been modified by the growth of agriculture. This transition has made the livestock business more safe and the man who attains the greatest success in this calling is today combining the growing of sheep, cattle and horses with enough farming to insure winter feed. to themselves. While coal is found in nearly every county



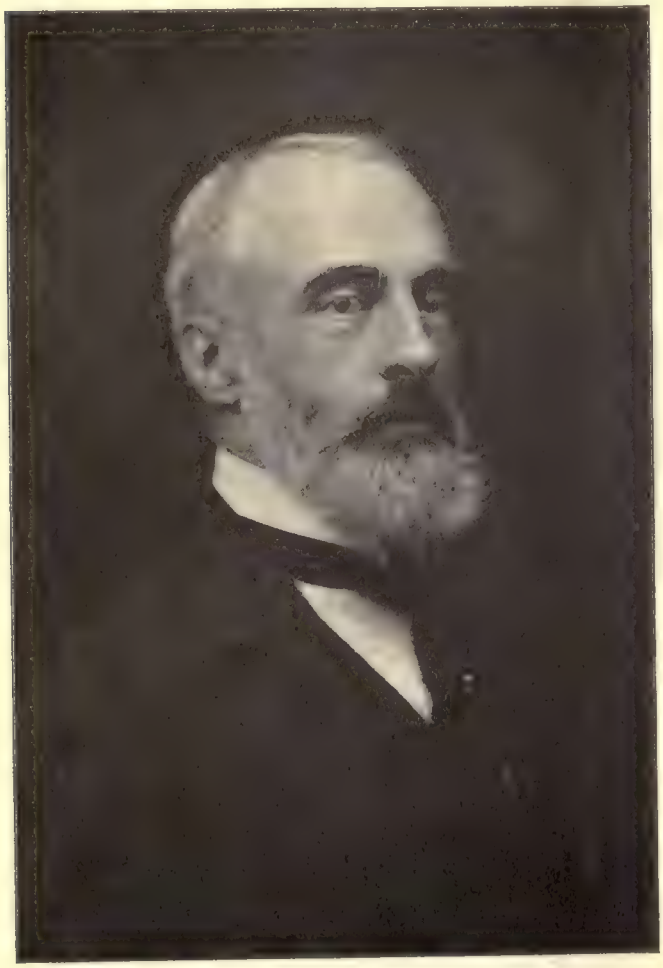
Water taken from its natural channel and conducted through artificial canals to dry lands leads to wealth and prosperity and insures the highest type of agriculture.

and while oil and gas wells are being developed in many sections of the state the mountains, many chains of which have scarcely been explored, are to add greatly to the wealth of the commonwealth. There timber is found in considerable quanaity. The streams have great fall and afford many opportunities for water power development. Immense bodies of copper, iron and other ores are now being opened up and within the next few years Wyoming will possess some of the greatest mining camps in the will possess some of the greatest mining camps in the world. growth in wealth and population. Opportunity beckons those who desire to invest in a virgin country, where every path leads to success and wealth. With scenery that cannot be surpassed in grandure, with innumerable opportunities for establishing resorts that for health and recreation can not be equaled, with a climate, soil and other agricultural conditions that should appeal to the highest type of the rural population of the land, Wyoming will be the home of the most progressive and most prosperous people that the earth has yet produced. Wyoming is today progressive as a state and as a people. No region offers so many inducements to those who wish to establish themselves in an independent pursuit. The state conducts an immigration commission for the purpose of assisting all who desire to study the resources of the state, and the opportunities it affords for all kinds of investments. Prompt replies will be made to all inquiries that are received by the state board of immigration, Cheyenne, Wyo.

YAKIMA COUNTY, WASHINGTON.

By GRANVILLE LOWTHER.

When Nature distributed her gifts she did not put all the best in one place, but she put so many of them in the Yakima Valley that its fame has become widespread. The source of this valley is in the Cascade Range, where there are snow-covered mountains, beautiful lakes, dense forests, vast deposits of coal and valuable minerals. From the lakes above the valley, comes the water supply for irrigating the lands newly reclaimed from sage-brush desert and turned into beautiful farms, orchards and gardens. This supply furnishes sufficient power to turn thousands of mills, run electric car lines and light millions of homes.



HON. GEO. E. BARSTOW.
President Seventeenth National Irrigation Congress.

Irrigation makes intensive farming possible; intensive farming produces large profits on small areas of land; large profits make great wealth and dense population. That which is possible is actually coming to pass, for our well-developed country districts are so thickly populated they look almost like the suburban portions of the city.

The dense population results in extensive public improvements. Where a family can make as much money on five acres of land as the average family will make on 160 acres, it is possible to place thirty-two families on the same area that will support one family in the unirrigated regions.

Thirty-two families on a small area like this contribute in a larger degree to the building of all public institutions and the establishment of commercial centers than is possible in the more sparsely settled, unirrigated districts. This produces a new type of social and intellectual life; in fact, the city and country are brought so close together that there are no class distinctions.

Yakima climate is healthful; the air is pure and invigorating. Its summers are not excessively hot, because every night the cool air from the ranges lowers the temperature and makes sleep refreshing. Its winters are not extremely cold, because the prevailing winds are from the northwest and the warm air of the coast, tempered by the Japan current, is conveyed across the mountains, this mitigating the cold that prevails in the same latitude farther inland. Its soil is a volcanic ash, rich in the chemicals necessary to produce the best fruits and vegetable products, which command the highest market prices, making the producers large profits.

Yakima County, bounded on the west by the Cascade Range, includes Mt. Adams, rising 12,307 feet above the sea and always covered with snow. In this part are vast deposits of semi-anthracite coal awaiting transportation by the railroads already under construction.

The county extends eastward about seventy-eight miles to the Columbia River and Benton County. The county seat is North Yakima, a city of about 13,000 population. Concentering at North Yakima, like the spokes of a wheel toward the hub, are fertile valleys and high plateaus, the very best fruit lands of the Northwest. The products of these valleys and plateaus must flow into North Yakima as a commercial center and the vast populations they will support it will make it the center of trade. There are already within a radius of three miles of the town, more people than there are within a similar territory in the entire country.

The city has five banks with deposits aggregating nearly $4,000,000. The general appearance of the principal streets, which are paved and have miles of cement walks, indicate to the visitor a city of busy, happy people. There are miles of stone and brick business blocks, presenting marked contrast to the sage-brush to be seen here and there from the windows of the railway and electric cars. Among the fine buildings recently erected are a court house costing $125,000; a thoroughly modern and up-to-date high school structure that cost $100,000; a Y. M. C. A. building; a Rex Spray factory; a State Fair building; a public library and hundreds of residences. No city of its size can show more progress and more public-spirited citizens. A large membership of all the principal denominations shows the moral tone of the city to be wholesome. Two new churches are just being completed at a cost of over $85,000.

A COUNTRY FOR HOMES.

There are times when nearly all persons long for

country life. Our populations came from the country, and their instincts and longings are for country homes. There is something restful and healthful about a country home properly built and conducted, that we cannot get in the struggle in the city. Therefore the hearts of men cry "back to Nature" as surely as the plant reaches for the sunlight or sends its rootlets into the earth in search of food. It is genuine pleasure to the educated mind to see the flowers bloom, the grasses grow, the trees laden with luscious fruits; to hear the bees hum, the birds sing and to listen to the music of the winds; to feel the stimulus of healthful exercise and the consciousness that he is producing, actually creating from the soil the equivalent of what he consumes. In the middle and eastern states the soil in places yields so scantily that life is too hard and living too meager to make either pleasant or profitable. But in this irrigated region, where often $1,000 in net profits can be taken from one acre of land, and where five acres make an income greater than 160 acres of the average cultivated lands in the east, is different. Homes are built outside the city limits that rival those of the city itself. Such conditions naturally attract the more intelligent class of citizens and make association with them doubly pleasant.

These homes, and the full bearing orchards, sell for a high price, but they yield a good interest on the investment. No other place is better adapted to the rearing of children. Freed from the temptations of the streets, they are at the same time in touch with the best educational systems.

GENERAL INDUSTRIES.

Many think that because this is a fruit-growing country other industries do not pay. This is an error which will be apparent upon a moment's reflection. Any one can see that where so many are engaged in fruit raising there will be greater demand for other products and a better market for them at home than if farming were diversified. Alfalfa brings a better price than if the majority of farmers produce it; and there are lands not adapted to fruits, where hay can be most successfully grown. There are lands also where dairying pays better than anything else. In some unirrigated lands wheat is profitably grown and potatoes yield abundantly. Poultry, too, and bee culture supplement the orchard industry in many ways.

A study of the following facts and figures is an object lesson to investors:

Brief synopsis of what the United States government has done and is doing in Yakima county:

Sunnyside Canal.

Number miles main canal	60
Number miles laterals (estimated)	100
Number acres now under irrigation	50,000
Total expenditure	$1,250,000

Is being still further improved and extended and several thousand acres additional will soon be brought under cultivation.

Wapato Project.

Number miles main canal	25
Number miles main laterals	55
Number acres irrigated	40,000
Total expenditure	$250,000

New Reservation Canal No. 2 (a part of the Wapato project) is soon to be extended about 60 miles and will have three laterals with a combined length of 25 miles. This extension will reclaim more than 100,000 acres. Estimated cost, $1,500,000.

Tieton Canal (Now Under Construction).

Number miles main canal	12
Three main laterals, combined length, miles	25
Number acres to be irrigated	30,000
Total cost when completed (estimated)	$1,800,000

RECAPITULATION OF GOVERNMENT WORKS.

Mileage.

Number miles main canals now in operation	85
Number miles main laterals now in operation	155
Number miles main canals now under construction	12
Number miles main laterals now under construction (estimated)	25
Number miles proposed extensions, upon which work will soon begin	85
Total number miles main canals and laterals	362

Acreage.

Number of acres now under government canal and laterals	90,000
Number acres to be reclaimed by canals now under construction	30,000
Number acres to be reclaimed by proposed extensions	100,000
Total acres to come under government canals	220,000

Cost.

Sunnyside canal	$1,250,000
Wapato project	250,000
New Reservation Canal No. 2 (estimated)	1,500,000
Tieton canal (extended)	1,800,000
Total cost of government works	$4,800,000

In addition to the government projects there are several corporate enterprises at work on canal systems which will add 12,000 to 15,000 acres to the irrigated area.

The total mileage of all main canals and main laterals in Yakima county, now in operation and soon to be constructed, is considerably in excess of 500 miles.

Note.—These figures relate to what has been done, and is now being done and what will be done in the immediate future, and not to what may and probably will be done at some indefinite future time.

Total number acres in county (including Indian reservation) 2,100,000

Classified as follows:

Orchard Lands.

Number acres bearing (500,000 trees)	8,000	
Number acres planted 1 to 3-year-old trees (2,000,000 trees)	25,000	
Number acres orchard lands under irrigation, not yet planted	15,000	
Number acres orchard lands not yet under irrigation	200,000	
Total number acres orchard lands	248,000	248,000

Farming, Stockraising, Etc.

Number acres farm lands under irrigation	120,000	
Number acres hops, small fruit and gardens	5,000	
Number acres lands under cultivation—not irrigated	20,000	
Number acres grazing lands—not irrigated	400,000	
Number acres government and state lands, timber lands and other wild lands (including reservation)	1,307,000	
Total number acres miscell. lands	1,852,000	1,852,000
Grand total all lands		2,140,000
Total lands in county under cultivation (acres)		193,000
Total lands in county under irrigation (acres)		173,000

Statement of the Value of Products of Yakima County for the Year 1908.

Apples and other fruit crops	$ 1,350,000
Potatoes and other vegetables	875,000
Grain crops	550,000
Hay crops	2,250,000
Livestock and wool	1,400,000
Hops	118,000
Nursery stocks	250,000
Cannery products	375,000
Dairy and poultry products	880,000
Manufactured products	2,100,000
Total value of products	$10,148,000

Population of county, 42,000.

Per capita production, $241.60.

POWER IRRIGATION

By E. C. Reybold, Jr.

ELECTRIC PUMPING.

When one is about to pump for irrigation purposes, and electricity can be secured at reasonable rates, there is no need for hesitation. With a well designed steam or gasoline plant but little trouble is experienced, but even at that there is no comparison between such power and electricity that can be favorable to the former if electricity can be purchased at a cost equal to the cost of fuel and labor. If a pumping plant operated by steam or producer gas is of considerable size (say 50 h. p. or more), and is well designed, electricity must be sold at a very low rate to compete with coal at less than $4.00 per ton. The above conclusions are from a financial standpoint only, as there is always a great advantage in favor of electricity when the petty annoyances and troubles usually experienced with steam, gasoline or producer plants are considered, not the smallest of which is that of delivery of fuel to the power plant.

From the standpoint of the individual farmer it is scarcely necessary to consider any plant of more power than about 25 h. p. which will pump sufficient water for a section of land lying 20 feet above the source of supply, or for half a section lying 40 feet high. And if electricity can be secured at present prices throughout the West —2 cents to 3½ cents per kilowatt-hour for pumping purposes—electric pumps are to be recommended. When a number of land owners together install a large pumping plant the kind of power to be used depends entirely upon the precise conditions at hand, and although electricity is always used wherever possible, it does not have the clear field that it does for small individual plants.

Electric motors are used quite generally for running working heads placed over deep or shallow wells, and but few windmills that are blown down in a section where electricity is obtainable are replaced. Such pumps will deliver ample water for residences and barns, but they are insufficient in capacity for irrigating any more than a small tract of land.

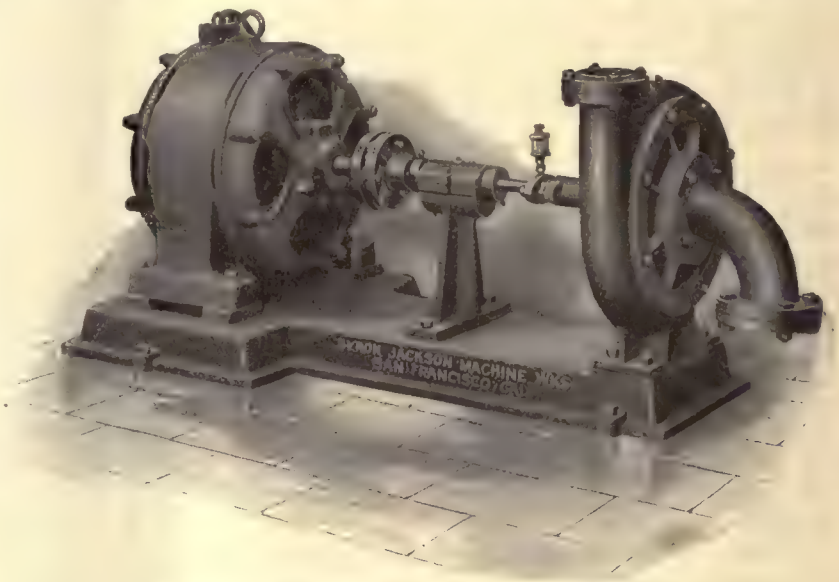
Rotary pumps are also frequently driven by motors, but gears must be used on account of the slow speed of the pumps.

Motors are peculiarly adapted to driving centrifugal pumps on account of the high speed of each, and as a major portion of all power irrigation is accomplished with such pumps, the combination is a fortunate one. Either horizontal or vertical centrifugal pumps may be driven by belts, but the ideal unit consists of a motor direct-connected to a pump of similar speed. The loss of power in the belt is thus obviated, and much floor space saved. Vertical centrifugal pumps are often direct-connected to motors with vertical shafts, a flexible coupling being used between in order that the motor may be required to carry only the weight of its own revolving parts. Vertical motors are more expensive than horizontal, and such units are not frequently used.

The most desirable combination of all consists of a horizontal centrifugal pump direct-connected to a motor that is mounted upon the same bed plate. A flexible leather link coupling should be used between in order that neither shaft may exert any strain upon the other, and that the motor armature may float as it desires. The end thrust of the pump should be compensated by special bearings and collars, or better by the special automatic water balance used by some manufacturers. The pump should be equipped with one or two ring-oiling bearings, the latter being essential with pumps of very large size. All motors have two ring-oiling bearings, and the matter of lubrication of horizontal motor operated units is of small consequence. The same is not true of vertical units.

The open type of runner is used by some manufacturers, but the enclosed type is rapidly coming into general use.

The speed of rotation of a centrifugal pump is determined by the head against which it operates, and the diameter of the runner, varying directly as to the square root of the head, and indirectly as to the diameter of the runner. If a motor of a certain speed is to be direct-connected to a pump, the runner must be properly proportioned for the head against which it must operate, and for the quantity of water to be discharged. Alternating current is used almost entirely for irrigation work, and such motors may be obtained running at any one of about six speeds, their cost decreasing with the increase of speed. The majority of motor manufacturers make motors of each size in but two or three speeds for standard types, although they are prepared to make them at any synchronous speed on special order. When once selected the speed cannot be changed. The above applies only to induction (alternating current) motors, as it is usually possible to obtain a direct current motor running at any reasonable speed, and it is also possible to change the speed of such a motor without great difficulty. Induction motors do not have brushes or commutators, as do direct current, and there



"Horizontal Centrifugal Pump Direct-Connected to Motor."

is no moving part that touches another part with the sole exception of where the shafts run in the bearings.

VARIABLE HEADS.

If a motor-pump with a fixed speed is designed for a certain head, say 30 feet, with a capacity of say 1,800 gallons per minute, it will operate at its best efficiency at that head. If a valve in the pipe at say 15 feet head is now opened, the quantity of water discharged will be greatly increased, probably reaching 2,400 gallons per minute. The power consumed by the motor will increase since the efficiency of the pump is decreased when the speed of the runner is too high for the head it is pumping against. If a direct current motor is used under such conditions, the speed should be reduced to that required for the lower head, but this is impossible with an induction motor, as indicated above. If, when operating under such conditions, it becomes necessary to reduce the pump capacity at the lower head to the original capacity for which it was designed, a gate valve may be used upon the discharge side of the pump to throttle the discharge. A certain loss of power is then occasioned. When it is necessary to operate under such conditions, it is advisable to use a motor of ample power to handle the greater quantity of water that will be discharged at the lower head, permitting the pump to throw the full quantity that it desires without throttling. It is an interesting fact that a motor driving a centrifugal pump at a fixed speed may be overloaded when pumping against a lower head than that for which it was designed, but neither motor nor pump can be injured by attempting to pump against a higher head, if the speed is not changed. The pressure created by the pump cannot exceed that which the runner speed and diameter will give, and if the head is greater than this, the water will rise in the pipe to the point which the pressure will give, and stand there without any flow. Such is always true when a centrifugal pump is operated at too low a speed. It is, of course, possible to have a head at which a small quantity of water will be discharged, but at a foot or two greater head no water would flow.

"Vertical Centrifugal Pump Direct-Connected to Motor."

PRIMING.

Priming may be accomplished in any of the ordinary ways. The use of a pitcher spout pump to suck water from the top of the pump, while the gate valve on the discharge side is closed, is recommended highly. A foot valve may be used if the height of lift and length of discharge pipe are not great enough to be dangerous. Many a pump has been cracked by water hammer in a long discharge pipe with a high head. A check valve may be used instead of a gate valve, but either a check or a foot valve cause a certain amount of drag upon the water while a gate valve gives a clear passage. If a priming pump is used the motor should be started when the pump is fully primed, the valve being slowly opened when the pump attains full speed. There is no danger of injury by keeping the gate valve closed when running, and if the valve is opened slowly the discharge pipe may be filled without overloading the motor. It is evident that the pump will discharge a tremendous quantity of water when operating against the small head that it has before the discharge pipe is full.

ATTENDANCE REQUIRED.

A motor-pump may be operated continuously through the irrigation season with no more frequent visits than are necessary to see that the oil cups on the stuffing boxes (if any) are filled. It can be run through the night without any attention whatever.

MAINTENANCE.

The repairs in a well designed motor-pump are usually considered as being negligible. A very small quantity of oil is required for a season.

POWER REQUIRED.

In order to determine approximately the power required for any pump, use the following short rule:

Multiply gallons per minute by feet head including friction, and divide by 4,000. The result obtained is the theoretical horsepower required. Then divide by the efficiency of the pump in per cent. A good centrifugal pump with a capacity of 900 gallons per minute or more will give an efficiency between 60 and 75 percent. Suppose we want to pump 1,600 gallons per minute 25 feet high, discharging it through 2,000 feet of 15-inch pipe in which the friction head is about 5 feet. The total head is thus 30 feet, which multiplied by 1,600 gives 48,000. Divide this by 4,000, and the result of 12 is the theoretical horsepower required. If the efficiency of the pump is 60 percent, divide by 60 per cent, and get 20 h. p. as the motor power required. A motor of ample capacity should be used, as there is no appreciable loss of power by using a motor that is larger than the actual requirement would seem to indicate. It does not pay to run a large motor at only one-quarter load, but at any point between half load and full load, the efficiency is very high, and the amount of current consumed will be just in proportion to the amount of work done.

TRANSFORMERS.

Alternating current is usually distributed at high voltages, sometimes exceeding 100,000 volts, but motors are never contructed for voltages higher than 2,200, and even then in no sizes less than 25 h. p. The power company will usually serve current at 6,600 or 2,200 volts, and unless a large 2,200-volt motor is to be used on a 2,200 volt line it is necessary to use transformers to reduce the voltage to that of the motors, which is usually 220 volts or 440 volts. If 220 volts is used, there is little danger to the operators, and lamps may be used on the same circuit to light the pumping house. Such is the voltage usually recommended for irrigating plants. It is usually the custom for the power company to serve current at a reasonable voltage, the owner of the motor to furnish transformers, if necessary. The capacity of transformers required for a pumping load requires careful consideration of both efficiency and

power factor of the motor to be used. Roughly, in small units, a transformer capacity of 1.2 kilowatts is required for each horse power actually delivered by the motor, but as the capacity required varies in accordance with the method of connecting the transformers, the advice of a competent engineer should be secured before making a decision.

COSTS OF IRRIGATING.

The costs of pumping an acre-foot of water (45,360 cubic feet) to any height with electricity depends only upon the cost of the current, without regard to the time required, the capacity of the pump, or the power of the motor, provided only it is assumed that the efficiecies of the units of various sizes are the same. Since this is true with but a small variation, it is considered a fact in compiling the annexed table. In this table the costs of pumping an acre-foot of water to various heights are given at various costs of electricity, with corrections for small pumps, belted units, etc. In order to determine the total cost of pumping for the season, the monthly charge for readiness-to-serve (if any) must be added to the figures taken from the table. For example, suppose we have a 20-horse power motor-pump lifting water 30 feet high, including pipe friction, and are irrigating 200 acres of land, the pump capacity being 1,600 gallons per minute, and cost of current 50 cents per month per horsepower for readiness-to-serve, plus 3½ cents per kilowatt-hour. According to the table, we find the cost of an acre-foot of water lifted 30 feet, with current at 3½ cents, is $1.76. If we want one acre-foot per acre we will want 200 times this, or $352. For a 20-horse power motor, the monthly charge will be $10, or $50 for the five irrigating months. Total costs for the year will then be $402, or $2.01 per acre. If, instead of one acre-foot, or 12 inches' depth over all the land, we used 8 inches' depth, the cost of current would be two-thirds of $352, or $234.65, plus $50, or $284.65, equal to $1.42 per acre for the 200 acres.

State Armory, where the Seventeenth National Irrigation Congress will hold its Sessions.

LENGTH OF TIME TO PUMP.

In order to determine the number of hours that a pump must operate to give one acre-foot of water for each acre of land, find out how many gallons per minute pump capacity you have for each acre, and divide that into 5,400. In the above case, we have 1,600 gallons per minute for 200 acres, or 8 gallons per minute per acre. Divided 5,400 by 8 and the result 675 is the number of hours required.

KILOWATT-HOURS REQUIRED.

A kilowatt of current will do a little more than a horse power of work, and a kilowatt of power running for one hour is called a kilowatt-hour. In the case of the 20-horse power motor-pump described above, the actual requirement of power at 70 per cent pump efficiency is 17 horse power. A little less than 17 kilowatts of electricity are required to operate the motor—about 15 kilowatt, to be precise—and the motor would consume 15 kilowatt-hours of current per hour. During the season the pump was to operate 675 hours, requiring a total of about 10,125 kilowatt-hours, which at 3½ cents, amount to $354.35, making a fair check of the figures given in the table.

Cost of pumping per acre of land lying at various heights at various costs of electricity in cents per kilowatt-hour. The quantity of water delivered will be one acre-foot or a depth of 12 inches.

	TOTAL HEAD IN FEET, INCLUDING FRICTION.									
Per K. W. H. Cents.	5	10	15	20	25	30	35	40	45	50
$0.25	$0.02	$0.04	$0.06	$0.08	$0.11	$0.13	$0.15	$0.17	$0.19	$0.21
.50	.04	.08	.13	.17	.21	.25	.29	.34	.38	.42
.75	.06	.13	.19	.25	.32	.38	.44	.50	.57	.63
1.00	.08	.17	.25	.34	.42	.50	.59	.67	.76	.84
1.25	.11	.21	.32	.42	.53	.63	.74	.84	.95	1.05
1.50	.13	.25	.38	.50	.63	.76	.88	1.01	1.13	1.26
1.75	.15	.29	.44	.59	.74	.88	1.03	1.18	1.32	1.47
2.00	.17	.34	.50	.67	.84	1.01	1.18	1.34	1.51	1.68
2.25	.19	.38	.57	.76	.95	1.13	1.32	1.51	1.70	1.89
2.50	.21	.42	.63	.84	1.05	1.26	1.47	1.68	1.89	2.10
2.75	.23	.46	.69	.92	1.16	1.39	1.62	1.85	2.08	2.31
3.00	.25	.50	.76	1.01	1.26	1.51	1.76	2.02	2.27	2.53
3.25	.27	.55	.82	1.09	1.37	1.64	1.91	2.18	2.46	2.73
3.50	.29	.59	.88	1.18	1.47	1.76	2.06	2.35	2.65	2.94
3.75	.32	.63	.95	1.26	1.58	1.89	2.21	2.53	2.84	3.15
4.00	.34	.67	1.01	1.34	1.68	2.02	2.35	2.69	3.02	3.36
4.25	.36	.71	1.07	1.43	1.79	2.14	2.50	2.86	3.21	3.57
4.50	.38	.76	1.13	1.51	1.89	2.27	2.65	3.02	3.40	3.78
4.75	.40	.80	1.20	1.60	2.00	2.39	2.79	3.19	3.59	3.99
5.00	.42	.84	1.26	1.68	2.10	2.52	2.94	3.36	3.78	4.20

These costs are based upon horizontal centrifugal pumps, direct connected to motors, with efficiencies as follows:

Pump 68%
Motor 88%
Pump and motor.....60%

If pump capacity is under 900 gallons per minute, make additions as follows:

700 gallons per minute.....10%
500 gallons per minute.....20%
300 gallons per minute.....30%
Under 300 gallons per minute.....40%

Figures for 5 and 10 feet may be a little low unless pumps are of large capacity.

Costs for higher heads are in proportion. For instance, costs for 95 feet equal costs for 45 plus 50 feet.

For belted units add 5 per cent.

A good horizontal centrifugal pump with capacity of 900 gallons or more per minute will give 68 per cent efficiency, but if a pump of poor efficiency is used, an addition must be made to the costs.

If a vertical pump is used add from 5 per cent to 100 per cent in accordance with type of pump, style of setting and method of carrying or balancing the downward thrust of the shaft and runner.

THE IRRIGATION AGE is preparing to publish all of Mr. Reybold's articles in book form. This work will not be issued until the full series of fifteen or more articles is published in this journal. This book will be fully illustrated, cloth bound, and will retail for $2.00, post paid.

The Truckee-Carson Project, Nevada, is the first project to be completed under the Reclamation Act of June 17, 1902, far enough to permit the delivery of water. Water has now been delivered for three irrigation seasons to part of the land and a part of the sum spent by the Government has already been returned to the Treasury. We have here the first fruits of the Reclamation Act and it is of much interest to see how this great movement has progressed so rapidly.

The Truckee-Carson Project has been considered as a possible irrigation scheme for over fifteen years. Private companies and individuals had gone so far as to run preliminary surveys, but the cost of the work proved so great that private means were insufficient and it was not until the passage of the Reclamation Act by Congress that Government aid was possible.

So prompt were the Federal officials to recognize the merits of the Truckee-Carson Project that fifteen days after the signing of the law by President Roosevelt the land within the limits of the proposed project was withdrawn from entry, except under the homestead law. Survey parties were organized at once and in less than a year advertisements were out for bids for the first construction work. Construction started in the fall of 1904 and was pushed to the fall of 1907.

The project as originally outlined provided for the construction of a number of storage reservoirs on the headwaters of the Carson and Truckee Rivers, a ditch from the Truckee to the Carson and a storage reservoir on the Carson to catch the floods of the Carson and to store the waters diverted from the Truckee. Distribution canals were to be built covering about 200,000 acres of land in the Carson Sink Valley. Other extensions of the project were planned, such as the Lovelock branch, to irrigate the lower part of the Humboldt Valley; the Pyramid branch, to irrigate land in and around Pyramid and Winnemucca lakes, and other similar subprojects. These extensions provided for the irrigation of an additional 150,000 acres of land, making the total of the project about 350,000 acres.

The first unit of the project or the 200,000 acres in Carson Sink Valley is so far completed that ditches and structures are ready for delivery of water to 100,000 acres of land. The canal from the Truckee to the Carson is completed. Lake Tahoe is the only reservoir so far utilized, but when the land now ready is settled it is planned to build a reservoir on the Carson River and extend the lateral system to include as much land as can be supplied from the reservoir; and when that is settled build more reservoirs and extend the laterals.

So much has been written about the engineering features of this project that it is hardly necessary in this article to enter into a detailed statement of the engineering problems, but just to point out a few of the more important matters and devote more space to the farmer and the interesting results he is bringing out.

Two important matters were established before actual work was commenced, the first was that all construction work should be of the most substantial character, built so that the smallest possible expense would be called for each year in maintenance; and, second, that main drains should be built at the start in order that each farm could get a drainage outlet for more extensive underdrainage, if such ever proved necessary. Following out these plans, concrete, steel and rock were used in all important structures and drains were dug to within one-quarter of a mile or less of each farm. Farm laterals, in the majority of cases, take water to the farm, but in a few cases the farmer will be required to connect with his takeout by means of his own ditch for a distance of one-quarter of a mile or less. This means that practically everything the farmer has to build is entirely within the boundaries of his farm.

Public land is cut up into 80-acre farm units, with a few 40-acre farms, to supply the demand for small homesteads. Land in private ownership is not cut up into farms. The only restriction on private land being that the maximum amount of land for which one owner can apply for water is 160 acres. When the Reclamation Service entered the valley a small amount of land had been farmed for many years. The vested right to water for this land was recognized by the Government and the owners of this land have secured rights in the Government system by agreeing to pay the annual maintenance cost.

The water charges are $30 per acre of irrigable land, payable one-tenth in advance, and the balance in equal annual payments. The second payment is due on December 1 of the year subsequent to that in which the filing is made.

A great many well-meaning men, attracted by the newspaper accounts of free homesteads in the irrigation projects have come West, expecting to make a successful farm out of a desert eighty without capital. Such men, however well meaning, are nearly all doomed to failure, for the reclamation of a desert homestead requires capital. Few men with less than $1,000 succeed and many with $2,000 do not make a success. It is impossible to say how much any one man should have, because individual tastes are so different, but it certainly should be recognized that the capital should be adequate to carry the family through two years, and leave enough over to meet any unforeseen emergency.

The soils of the Truckee-Carson project are desert soils; the climate is one of the driest in the West; consequently the amount of vegetable matter in the soil is small. Where the soil is sandy, the wind causes trouble until a stand of some crop is secured. The country is not windy, compared with the majority of irrigated valleys of the West, and when once a stand is secured no further trouble ensues.

The lack of organic matter in the soil necessitates the planting of some crops which will leave organic material among the soil grains. The majority of farmers

have found alfalfa the most successful crop for this purpose. Could stable manure in quantities be secured any crop could be grown on the virgin soil, but of course in a desert country this is not possible.

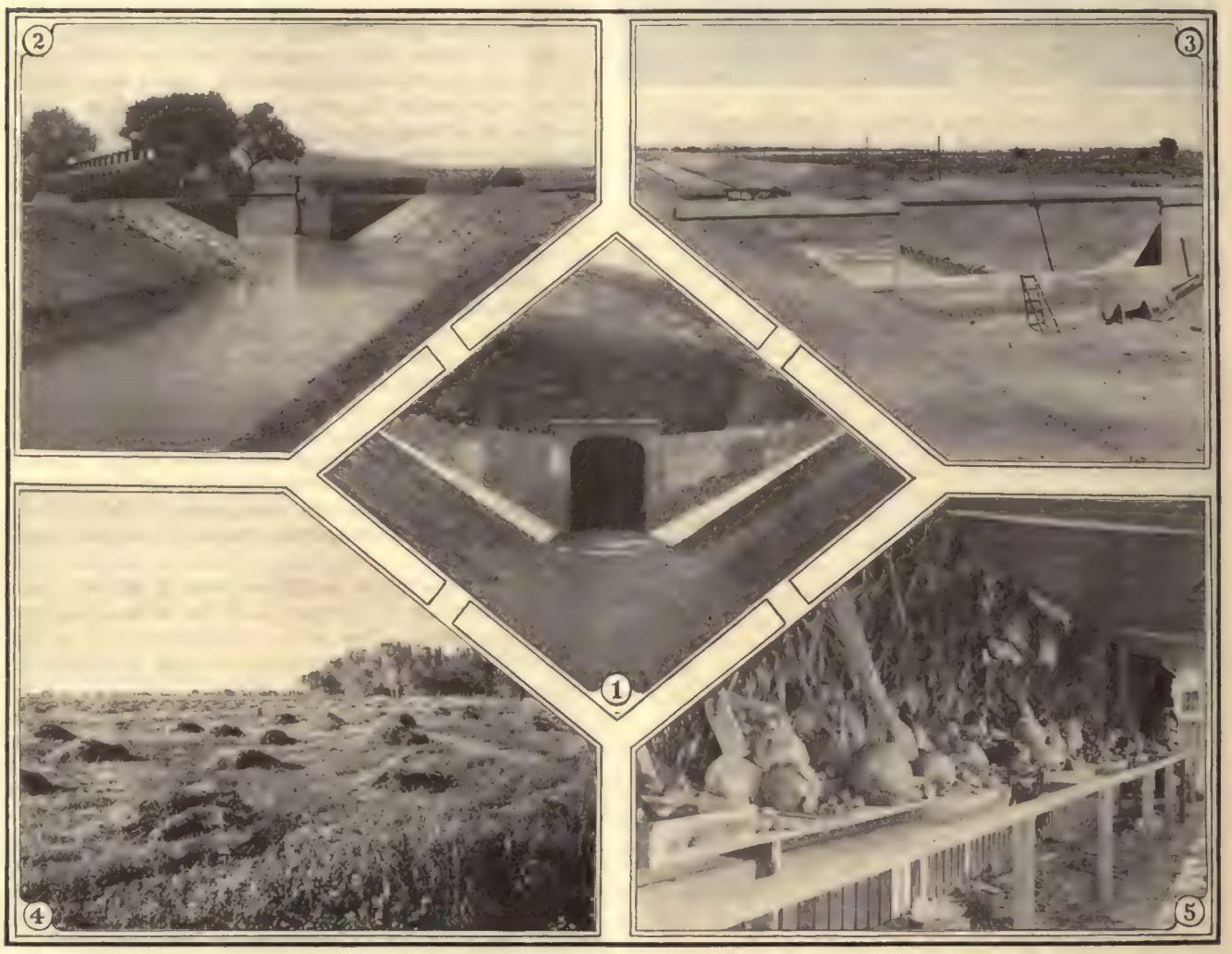
The new farmer, therefore, finds it necessary to seed his land as rapidly as possible to alfalfa, for, once in alfalfa a year, it will produce any crop which can be grown in the north temperate zone. Little can be produced the first year, unless the farmer has been fortunate enough to secure an eighty with a very level surface, requiring a minimum amount of leveling. The second year some returns commence to come in and in the third year, if common sense has been used, the profits commence to show.

produce will be produced on these irrigated farms and will find ready markets in the cities around San Francisco Bay. Already Nevada beef, mutton, potatoes and dairy products are well known in California, and Nevada farmers are reaping profits from their shipment.

Now, in order to convey some idea of the progress already made in the settlement and reclamation of this, the first great reclamation project, let us see how much land has been taken up and see how much is actually under irrigation and what crops have been grown.

On December 1 of this year we had 322 homesteads filed on and water right applications filed for 30,566 acres of land.

An agricultural census taken during November of



1. East Portal of Tunnell, Truckee-Carson Project, Nevada. 2. Showing the Heading of Take-Out of T-line Canal at the Diversion Dam on Carson River, Nava. 3. View Showing Drop in "L 1" Line Canal at Station 485-42, Looking Down the Canal. Truckee-Carson Project. 5. Part of Vegetable Exhibit, First Annual Churchill County Fair.

The Truckee-Carson Project is the largest agricultural region in the state of Nevada. Last year Nevada was third in the production of gold and fourth in the production of silver among the states and territories. A large mining population has entered the state in the last few years and these mining camps are the markets for the products of the farms on the project. California is so close that much of our excess produce is already being shipped there and this project will rapidly become the center from which the California slaughtering houses will be supplied. Dairy produce, poultry, potatoes, onions and many other type of staple farm

this year shows that we have under actual cultivation about 27,000 acres of land, as follows:

	Acres.
Pasture land	10,000
Alfalfa and hay	13,500
Grain	2,700
Potatoes	500
Garden	180
Orchard	150
Miscellaneous	100

	Head.
Horses and Mules	1,960
Cattle	1,880
Hogs	1,031
Sheep	6,075
Poultry	12,760
Stands of bees	1,250

BASIC VALUE OF IRRIGATION BONDS

The accompanying article—the clearest explanation of the basic value of irrigation bonds—is reproduced from the proof sheets of a book which will soon be issued by the well known bond house of Trowbridge & Niver Co., First National Bank building, Chicago.
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In discussing with our customers one particular class of securities we seek simply to give information.

We are dealing here with bonds which are not well understood. Irrigation, on a broad scale, is rather a new subject of popular interest. It deals with lands which are arid and yet so fertile that the artificial application of water makes farming immensely profitable. And investors in general are awakening to the fact that the securities based on these projects are of the most desirable class.

With those who know, Irrigation Bonds are already popular. The security behind them is a first lien on the most productive farm lands in America. The interest return is liberal, and higher than it will be when the bonds become better known. The bonds are generally issued in serial form, with widely different dates of maturity. So one may secure either long or short-time bonds. And the issues are frequently in denominations as low as $100. This opens the way to the small investor in a manner not usual with other good issues of bonds.

As a result, the best selling bonds that we handle today are Irrigation Bonds. A very large percentage of our business is done in them. With the spread of education regarding these bonds, the demand is increasing —fairly by leaps and bounds. And we feel that we are doing our customers a service in contributing to that education.

Palisade, Colorado, Grand Valley. Full bearing orchards in this district sell at $2,000 per acre and upwards. They produce from $500 to $1,200 per acre in a season. Eight hundred cars of fruit valued at $3,200,000 were shipped from here in the season of 1908.

But it should be remembered that our attitude always is that of unbiased advisers. We have little reason for urging investors into any particular channels. Our province, as a bond house, is to follow the trend of investment—to supply what our customers want. Our success depends, and has always depended, on supplying the best securities of the classes in widest demand.

The enormous business of Trowbridge & Niver Co.

was originally built up by the sale of Municipal Bonds. In those days, bonds issued by cities, counties, districts and states were in widest demand. These, of course, remain a standard of security. But the popularity of Municipal Bonds gradually lessened the interest rate. Then a very large class of investors sought for a larger return.

For many years, we have been among the largest dealers in Public Utility Bonds. These include Railroad, Water, Gas and Electric Light Bonds, Water Power Bonds, Telephone Bonds and bonds on Electric Railways. These, for a time, were our most popular

It should also be remembered that our business is done with a very conservative class of investors. Our bonds are sold mainly to Banks, to Trust Companies, to Trustees, and to individuals who are careful and experienced investors of money. This fact makes it impossible for any trend of our business to take other than conservative lines.

We suggest these facts to make clear the point that we are not making a plea for any one class of bonds. Our purpose is simply to extend information. If Irrigation Bonds appeal to you, when you know the facts, we shall be very glad to supply them. But, if your

A field of Sugar Beets in the Denver-Greeley District. The farmer gets $5.00 per ton, delivered at the railroad track, and raises from 15 to 23 tons to the acre.

securities, and they still retain popularity. But the very popularity of these bonds, as always, served to lessen the interest rate.

We still handle all these classes of bonds, and in a very large way. We are just as glad to supply them, when wanted, as we are Irrigation Bonds. The fact that Irrigation Bonds form the major part of our business today is due to our customers' preference. There seems to be no large class of bonds giving equal security and bearing so liberal an interest rate. And this, as with other bonds, will adjust itself as the bonds become better known.

preference lies in another direction, we shall be equally glad to meet it.

Nor does this book deal with any particular project. It will merely explain Irrigation projects in general. The facts about any particular bond will be given in separate circulars upon application.

FIFTEEN YEARS OF EXPERIENCE SELLING RECLAMATION BONDS.

We have had fifteen years of experience in selling Drainage and Irrigation Bonds. These two classes of bonds are essentially similar. One is issued to drain wet land, the other to water dry land. The purpose of

both is to supply the funds for reclaiming or improving barren or unproductive lands. And both are secured by a first lien on the land which they serve to improve.

During those fifteen years, we have handled sixty-nine separate reclamation issues in eleven states. Not a dollar has been lost by any investor in them.

Again and again we have seen these barren lands flourish into fertility. We have seen many lands, almost wholly unpopulated, become dotted with comfortable homes and prosperous towns and cities. In scores of reclamation projects, we have watched swamps or deserts change, by drainage or irrigation, into productive lands. We have seen arid lands covered with sage brush and cacti. And we have seen the same land, one or two years later, bearing the finest products which are grown in America.

Dam on the Snake River near Idaho Falls, Bingham County, Idaho, Municipal Irrigation District.

Every project of this kind for which we sell bonds is made the subject of minute investigation. The officers of our Company have tramped every piece of bonded land on which we have sold securities. We have watched every project through to fulfillment. In this way we have learned, in the course of years, to distinguish between the certain and the uncertain.

We have also learned where new laws were needed for the protection of the investor. And numerous laws of this class have been passed through our influence. We have learned what amount of loan is safe on each separate class of land. We have learned the form of Mortgage or Trust Deed or Contract best suited to protect that loan.

Much of this, for a time, was pioneer work. We were blazing new trails. For instance, when Congress passed the "Carey Act," we spent thousands of dollars to have attorneys work out the best form of Trust Deed. And this form has been employed as a model, by us and by others, for nearly all the projects since.

Thus we have secured our own education and have compiled and tabulated in our office files reliable information including elevations, temperatures, annual rainfall, run-off, flood periods, slopes, soil analysis and stream gaugings covering a period of years. We have in our library the laws of the various states and everything of importance, both legal and physical, pertaining to the reclamation of agricultural lands. Thus we have built up, in the course of years a perfect organization capable of passing intelligently upon the merits or demerits of any project, and if accepted by us, to formulate contracts, mortgages and tax liens so as to secure the best protection to ourselves and our customers.

The large number of issues handled by this house has established our pre-eminence in the purchase and sale of Reclamation Bonds.

Our experience, our prestige and our wide acquaintance in the irrigation sections command for us first

consideration when an issue of bonds is to be marketed.

In almost every instance, any proposed issue of Irrigation Bonds is submitted to us before being offered elsewhere. Thus we are able to secure for our customers the cream of the bonds of this class.

Only such as afford absolute protection to the bondholder are accepted by us.

The facts in this book, therefore, relate to selected issues. They should not be applied to irrigation projects in general. We mean no reflection on general bonds of this class. Many very good issues have been sold through other channels. But in this, as in all other classes of bonds, some are better than others. The worth of an Irrigation Bond depends on many things, the measuring the projects are located, each has its special attractions. But all form a first lien on fertile and tillable land. And all, if properly issued, afford the investor more than ample security.

We will deal with the classes separately.

MUNICIPAL IRRIGATION DISTRICT BONDS.

These Irrigation Bonds are issued by organized districts, very similar to school districts, for the purpose of purchasing or constructing irrigation systems for their own use.

The bond issue must be approved by a majority of the resident free-holders in the district who have paid taxes the preceding year. The procedure is quite similar to that of a school district issuing bonds to construct a

View of a portion of the Milner Dam on the Snake River, Idaho—Twin Falls project (South Side).

of which requires training, experience and judgment. It is desirable, therefore, to buy such bonds from a house which has wide experience and ample facilities in this particular line of investment.

THREE GENERAL CLASSES.

Irrigation Bonds may be broadly divided into three general classes: Municipal District Bonds, Corporation Bonds on lands in private ownership and Corporation Bonds, issued against lands under the provisions of the Federal law known as the "Carey Act."

Of these three classes of Irrigation Bonds, differing according to the laws in the various states in which school house, or a municipality issuing bonds to purchase or construct a City Water Plant. The bonds then become a municipal obligation, constituting a first lien on all town and farm properties included in the district.

The interest on the bonds, and the maturing bonds, are paid through the County Treasurer's office, by a tax, levied in the regular way. This tax is usually levied for about 15 per cent in excess of requirements, so as to provide for possible delinquencies.

The value of such bonds, as with all Municipal securities, depends on the population of the district and on the value of the property subject to the tax lien.

Many of them belong among the highest grades of Municipal securities.

CORPORATION "CAREY ACT" BONDS.

These bonds are issued by Corporations to reclaim lands segregated from the public domain for the purpose of irrigtation and development under the provisions of the Federal Law introduced by Senator Carey, of Wyoming, commonly known as the "Carey Act." The segregation is made by the United States Department of the Interior after request made to the State Land Board and certification of their approval to the Secretary. Bonds issued on such projects are usually made to mature in ten annual installments—one to ten—or two to twelve years.

After these lands have been segregated, the prospective settler must make a contract with the Corporation for a water right before entering upon his land.

Supervision of the system of irrigation is maintained by the state engineers and State Land Board until the entire construction is satisfactorily completed and the system turned over to the settlers.

In this way the settler is guaranteed a perpetual water right with good title. The settler pays 10 per cent of the purchase price of his water right and in his contract gives a mortgage on the water right purchased, and on his equity in the land to secure the deferred payments.

These deferred payment contracts, which mature serially in from one to ten years, are deposited usually on the basis of one and one-half to one, or $1,500 in such contracts to each $1,000 of bonds so issued. These mortgages and contracts are deposited in escrow with some responsible Bank or Trust Company, designated by us, which acts as Trustee under the issue.

Dam, Head-gates and Canal of Canyou Canal Company, Payette River Valley, Idaho. This system furnishes water to the Emmett Bench destined to become one of the best fruit sections of the irrigated west.

CORPORATION BONDS ON LANDS IN PRIVATE OWNERSHIP.

This class of Irrigation Bonds is issued by a Corporation for the purpose of acquiring or constructing water rights and irrigation systems.

The bonds are a mortgage lien on all of the property owned by the Company. In addition, they are secured by mortgages on the land to be irrigated. These mortgages or trust deeds are given by the farmers owning land subject to irrigation, to secure deferred payments on water rights purchased. Such mortgages are usually in serial form and they are deposited with a

Trust Company, which acts as trustee for the bond holders. For each $1,000 bond issue there usually is deposited with the trustee $1,500 in these mortgages on fertile agricultural lands.

For illustration—Suppose the owners of farms mortgage their land for one-third of its value to obtain a water right. Then these mortgages are deposited with the trustee at the rate of one and one-half to one, to secure the bonds. That means that for each $1,000 bond the trustee holds farm mortgages to the value of $1,500. And those mortgages cover farms worth three times as much. Then back of each $1,000 bond will be first Mortgages on land worth $4,500.

In buying a water right for his land, a farmer is required to pay 10 per cent cash. He agrees to pay the balance in nine annual payments with interest. The mortgage on his land is given to secure this agreement. That is why Irrigation Bonds are usually issued with serial dates of maturity. The payments made by the farmers are used to retire the bonds as they fall due. This is a far better plan than the accumulation of a redemption or sinking fund as employed in some other forms of bond issues. The proportion of security in the hands of the Trustee is always maintained until the last bond is paid.

As the early bond maturities are paid, the security

Cabbages, Melons, Squash, Sugar Beets, Onions, Turnips, Egg Plant, Cauliflower, Grain and Alfalfa—all these grow in the Denver-Greeley district, and find a market right at farmer's door at top prices.

That would seem to be ample security. Yet the bonds are additionally secured by a first mortgage on all the property owned by the Irrigation Company which issues them. As the proceeds of bond issues go into the property, this mortgage on the Company's property is a material consideration.

These farm mortgages are not usually given by owners of large tracts of land. In these irrigated regions, farm land is exceedingly fertile, and small farms intensively cultivated are the rule. A few owners may give mortgages on 160 acres, but far more are owners of 10 and 20-acre tracts.

behind the balance, of course becomes more and more ample, for the reason that the mortgage is not released until the entire debt is paid.

SUPERIOR TO FARM MORTGAGE SECURITY.

It will be noted from the above facts that an Irrigation Bond has the strength and security of a conservatively margined farm mortgage combined with all the advantages of corporate responsibility. It would be hard to conceive of a more attractive form of investment than well selected bonds of this class.

Farm mortgages, issued not to exceed 40 per cent of the value of farm land, are rightly considered a first-

class security. When such farm mortgages are placed with a trustee, and bonds issued against them to not more than two-thirds of their value, the security is considerably increased. And when such bonds are further secured by a mortgage on the vast properties of an Irrigation Company, it will be seen that the protection is fully as ample as the most careful investor desires.

Such is the security lying back of our Irrigation Bonds. It will vary slightly with different projects, but not in a way to greatly affect the security.

The next point to consider is the value and earning power of the land on which the security is based.

THE VALUE OF IRRIGATED LAND.

A mortgage on arid land, to the average investor, appears very different from a mortgage on farm land located in a humid locality. And here is the main need for an education.

Previous to irrigation, it is true that this arid land has grown nothing but sage brush and cacti. Its barrenness is quite uninviting. The value of the land is due solely to its grazing possibilities, or to the probability of future irrigation.

But this same arid land, when the water is applied, becomes the most productive farm land in America.

Colorado, which has the largest irrigated area of any state, will serve as an illustration of the productive power of irrigated lands. It should be remembered that all the arable land in Colorado, save that used for "dry farming," is irrigated land. And the farm products of Colorado last year were valued at $143,688,577.

Rocky Ford cantaloupes, grown on irrigated land south of Denver, are famous almost the world over. They sell for $2.50 per crate, while other melons on the same market, grown from the same seed, sell for 30 cents per crate.

Peaches from the Grand Junction District bring from four to six times as much as Middle West peaches.

Fruit lands in the Denver-Greeley District often yield more than $1,000 per acre.

Colorado potatoes are the highest standard everywhere. They are dry and mealy, thin-skinned, free from hollow centers, and they are also enormous yielders.

Colorado stands first in the production of beet sugar. There are nine sugar factories north of Denver and about an equal number south. Last year, Colorado farmers received for their sugar beets over $10,000,000.

Colorado has the greatest canning works in the United States.

Colorado pea-fed pork commands in every market a higher price than any corn-fed pork.

According to statistics of the Colorado State Agricultural College, the Denver Greeley District—the largest body of irrigated land in the country—produces highest value per acre of any land in the world devoted to general farming.

In California, Oregon, Washington, Idaho, Wyoming and Montana, the irrigated lands is among the most valuable and most productive farm land in America.

REASONS FOR FERTILITY.

The marvelous fertility of this arid land is largely due to its richness in mineral salts. Potash, sulphur, lime and phosphorous are found in the soil in abundance. It is estimated that good land in the irrigated districts is ten times as rich in nourishing salts as good land in Illinois.

In humid districts, the rains of ages have washed out a large part of these mineral salts. And millions of crops of vegetation have served to disintegrate the soil. This arid land, on the contrary, is in a virgin state of fertility.

Another reason for large crops and fine flavor is the perpetual sunshine. Arid districts have very few cloudy days. The sunshine and the dry air increases the evaporation from the plant foliage. This increases the circulation of sap, hastens its chemical changes, and increases the nutriment fed to the plant.

But the main reason, perhaps, for abundant and unfailing crops, and crops of the highest grade, is control of the water supply. Every farmer is his own weather-man, and is able to give to each crop just the water it needs at the time when it is needed. He gives little or much water, withholds or applies it, according to the crop or conditions.

In rainfall districts this is impossible. The farmer must take the moisture sent him, and when it is sent. Some crops require little moisture, some require much; yet all of his crops are watered alike. Sometimes he has a drought; sometimes a long rainy season.

Thus every crop is full of uncertainties. The farmer, to be safe, must plant a variety of crops. He must provide for both a dry and wet season, else take very long chances. And the crop failures, due to unregulated rainfall, greatly reduce his average production.

CERTAINTY OF CROPS.

On irrigated land, the farmer may raise such products as he wishes, and know that the crops are certain. He has control of his water supply. He can apply it or stop it, give little or much, as the crop or conditions require. This certainty of crops, and of maximum yield is one of the greatest factors of value in irrigated land.

Another factor is the depth of the soil. Another the freedom from insect pests. Another the ease with which the land can be cultivated. Another is the higher value of the crops which the land is fitted to raise.

An acre of irrigated land planted in sugar beets will net the farmer four times as much as an acre of Illinois planted in corn.

Land planted in potatoes will bring all the way from $100 to $300 per acre. Strawberries often yield from $400 to $700 per acre. Orchard lands often return $1,000 per acre and more.

One tract of 100,000 acres in Colorado on which we are selling bonds at this writing, is located close to Denver. It extends from five to twenty-five miles from this growing city of 208,000 population. This fact makes the land particularly valuable for suburban homes and for truck farming.

For all of these reasons, the value of irrigated land, well located, is exceedingly high. Very often one year's crop is sufficient to pay for the land and water. And the value of this land is advancing at a tremendous pace.

It is safe to say that good irrigated land is worth from three to five times as much as the best rainfall land, measured by production.

Therefore, the liens on farm lands which are back of irrigation bonds are, as a class, more valuable than any

that we have in America. And the value of this land, because of its restricted area, often multiplies itself several times over under cultivation.

IRRIGATION BONDS ARE AMONG THE SAFEST INVESTMENTS.

As drainage and irrigation bonds have formed an increasingly large part of our business, the officers of Trowbridge & Niver Co. have spent sufficient of their time in the western and middle western states to closely study irrigation and local conditions generally, and more particularly the projects in which we have been interested.

Again and again, we have watched these projects begun, carried out and completed. We have seen the barren land blossom into fertility. We have seen it multiply in value, over and over, until some of it has grown to be the most valuable farm land in America.

Some of this land could not now be bought for one hundred times the amount of the original bonded indebtedness.

As a result of this experience, we are prepared to state that Irrigation bonds, of the right classes, are among the safest investments we know. They are loans on farm land which is productive and valuable—some of the very best farm land in America. The loans are made, in the right sort of projects, at a very conservative rate. They are repaid by the land owners, usually, at the rate of ten percent per year. And the bonds, being in serial form, are gradually retired. The security back of the remaining bonds increases with every payment.

Bonds of this class now pay a higher interest rate than one can secure on any large class of securities equally safe. One reason is that the bonds are a comparatively new form of investment. They have only come into wide popularity in recent years.

Our Irrigation bonds are issued in denominations of $100, $500 and $1,000. This opens the field to the small investor, as well as to Banks and to Capitalists.

We know of no class of bonds which, at present, offer equal security combined with equally attractive income. And it is difficult to imagine, when Irrigation bonds are gone, what other class of security can be found which embraces so many desirable features.

Still, the purpose of this book is merely to give information. It is not a plea for any one class of securities. We supply what our customers want. But we feel that we owe to our patrons this statement of the facts as we know them. For here is an opportunity, which cannot last many years, to secure an unusual rate of return on an ideal class of security.

IRRIGATION BONDS ARE PAID—NOT REFUNDED.

Unlike the vast majority of bonds, irrigation securities are paid, and not simply refunded at maturity by substituting new issues. Each series is retired as fast as it falls due, by the payment of actual cash.

The great earning power of the lands, and irrigation systems behind them, provides vastly more money than is ever needed to meet both principal and interest.

They are not affected by panics or periods of financial depression.

The manner in which our Irrigation Bonds went through the recent panic has called world-wide attention to them, as an attractive form of investment.

To those who are interested, we shall be glad to send circulars and quotations on current issues.

TROWBRIDGE & NIVER CO.

IRRIGATED LAND

Open to Settlement

Some of the richest and most productive farm land in the world lies along the Shoshone and the Big Horn Rivers in the "Big Horn Basin" of Wyoming. Over ten million dollars is being spent by the United States Government and by private enterprise in building great concrete dams and ditches in order to lead an inexhaustible supply of water to irrigate some of the best of these lands and make them independent of rainfall. A great portion of this work is completed, and these lands, with a perpetual supply of water for irrigating them, are now offered you on reasonable terms.

This is an Unusual Opportunity

to get a wonderfully productive farm, with water whenever you want it, regardless of rainfall; in a country where a single crop can be made to pay for the land; where 50 bushels of wheat or barley, and 75 bushels of oats are commonly grown to the acre; where fruits grow luxuriously and where the glorious air and sunshine, summer and winter, make life a joyous thing.

This wonderful country is developing fast. Churches and schools abound. The population is intelligent, Godfearing and law-abiding, and any man out there who is half a man has the opportunity to make himself independent.

Land in this great country is going fast. If you have any thought for the welfare of yourself or children, find out all about this opportunity to-day.

Send for our new folder with large map, and **also folders issued** by the private irrigation companies and by the United States Government Reclamation Service **giving all information about these lands, terms, etc. Free for the asking.** Study these folders and then **come with me** on my next excursion to the Big Horn Basin and see for yourself. My excursions, which I personally conduct, leave Omaha on the 1st and 3d Tuesday each month, on which days reduced railroad rates are in effect. My services are free to you.

Burlington Route

D. CLEM DEAVER, General Agent

Landseekers' Information Bureau,

59 Q Building, OMAHA, NEB.

N. B.—The winter weather in the Basin Country is fine and lands can usually be seen to advantage all Winter,

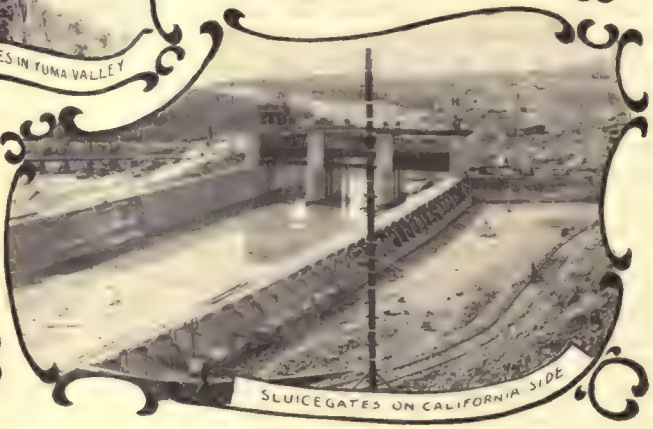
YUMA PROJECT
ARIZONA

CONSTRUCTION ON THE YUMA LEVEE

GROWING DATES IN YUMA VALLEY

BRUSH FENCING AND MATTING

HARVESTING THE SEASON'S THIRD CROP


SLUICEGATES ON CALIFORNIA SIDE

The work of closing the Colorado River, twelve miles above Yuma, Arizona, had a most spectacular finish. The government engineers have been engaged here for months in building a dam the like of which this country has never seen before. On December 21st the channel of the river was closed and the entire flow of the river passed through the giant sluiceways at either end of the dam. The supervising engineer wired to Washington: "The river is closed and we sat on the lid while a five foot rise, carrying 40,000 second feet of water, passed by."

The engineers encountered many difficult problems in planning the big irrigation systems which the government is constructing in the arid West, but no more complicated conditions confronted them anywhere than in attempting to control the Colorado River in order that 130,000 acres of exceedingly fertile soil in California and Arizona might be made fruitful.

The size and uncertainty of the river, the shifting channel and unstable banks, the yearly recurring inundations, variations in volume from low water to flood heights and the immense volume of silt carried by its yellow waters, made the problem of the control of the stream unique in the history of American irrigation. With these difficulties fully understood and no bedrock for a base, the problem presented to the engineers was to build a structure on the sand and silt that would fully control the river, holding it within certain prescribed limits, and at the same time make some disposition of the silt, one of the most difficult features of the undertaking.

Constructing Engineer E. D. Vincent gives the following description of the structure:

"The most advantageous weir site was found to be at Laguna, twelve miles above Yuma, where granitic mountains encroach on the river valley, leaving an opening about a mile wide. The type of weir selected was one that has been in successful operation for many years in India and Egypt under practically identical conditions with those presented in Yuma Valley.

"Three concrete core walls 4,800 feet in length and 57 and 93 feet apart extend from bluff to bluff. The crest wall with a maximum height of 19 feet above the bed of the stream, rests upon a row of 6-inch sheet piling from 12 to 20 feet in length, incorporated in its base to cut off seepage. The space between the walls is

filled with broken stone, and an apron of rock extends 40 feet beyond the lower wall. The structure between walls is capped with a concrete pavement 18 inhes thick. On the up-stream side of the weir a talus of broken rock, with an incline of 2 feet horizontal to 1 foot vertical, protects the concrete structure. The dam is 4,800 feet long between abutments, 19 feet high in the river channel, and 226 feet in width up and down stream."

The dam will raise the water about ten feet, backing it up stream nearly ten miles and forming a settling basin covering approximately 8 square miles. At the west end of the weir, constructed in solid granite rock and excavated to the depth of low water in the river, is a sluiceway 116 feet wide. At the east end the sluiceway, also in granite, is only 40 feet wide. These sluiceways are closed by large gates operated by hydraulic machinery. These gates are of what is known as the Stoney type, the only other gates of the kind in the country being located in the Chicago drainage canal. They are of steel throughout, and are 18 feet high and 35 feet wide.

The diversion canals are taken from the sides of the sluiceways above the gates. The areas of the sluiceways being so great the movement of the water toward the canals will be slow, and most of the sediment will be deposited before reaching the canal intakes. When the silt has accumulated to a considerable depth the sluicegates will be opened, and the great volume of water which will rush through the sluiceway will carry out with it the sediment deposited above the intakes of the canals. As most of the silt is carried near the bottom of the river and the top is comparatively free from sediment, the water will be taken into the canals by a skimming process, over a long row of gates, so the canals can be filled by drawing but one foot in depth of water from the surface. In times of flood the Colorado River overflows its banks, inundating the country for miles around and in order to protect the lower lands an elaborate system of levees has been built. These dikes have an aggregate length of 75 miles, and are considered the most perfect ever constructed. The dimensions of these embankments are those which experience on the Mississippi River during the past 60 years has proved to be the best. At base they are several times as wide as their height. The tops of the dikes are four feet above the highest known floods. The river side is protected at frequent intervals by brush defences to ward off the attacks of the river.

A portion of the waters of the main canal on the California side will be carried under the Colorado River by a siphon, and used for the irrigation of land near Yuma in Arizona. It is expected that considerable power will be developed here which will be used to pump water to the mesa lands. The farmers pump and the big scoop wheel at Yuma are already furnishing water to several thousand acres of bottom land below Yuma.

For months the great weir which the government is building across the river had been creeping out from either shore, the opening between the two ends gradually narrowing until only 600 feet remained. Two temporary railroad bridges, resting on piles driven deeply into the yielding sands and silt on the bottom of the river, were built above the dam, and from these rock was dumped by the car load until on December 21st, the river channel was completely closed and the water was backed up until it flowed through the sluiceways previously prepared. The work of connecting the ends of the core walls was immediately commenced, and the dam will be completed soon.

Next October it is probable that 17,000 acres of land in the Indian reservation on the California side of the river will be thrown open to settlement. The date and manner of disposing of these lands will be announced by the Secretary of the Interior through the public press. The other lands, for which water will be available in 1909, are all in private ownership, but there are many tracts of excess holdings or farms whose owners do not reside in the vicinity that may be purchased.

In soil, climate, and agricultural possibilities the lands of the Yuma project are singularly like those in the valley of the Nile. Date palms and Egyptian cotton have both proven well adapted to this section and all the grains and fruits of the temperate and semi-tropical zones produce abundantly.

Alfalfa yields from 7 to 12 tons per acre and sells at $6 to $10 loose in the stack. The baled hay brings about $15. Yuma oranges, grape fruit, cantaloupes and vegetables are the first on the market and their quality is unsurpassed. On the experiment farm the Department of Agriculture has set out more than 200 varieties of the date palm which were imported for the purpose, and which will be transplanted to the rich bottom lands as soon as water is available. The experiments in cotton culture which the department has been conducting on this little Government farm are most interesting. It has been found that Egyptian cotton of an excellent quality grows well in this section when once acclimated, a test plat in 1907 yielding about 1,000 pounds of cotton lint per acre. The average price during the year was 21.9 cents. We import about 62,000,000 pounds of this cotton annually, and it is estimated that 100,000 acres of such lands as is included in the Yuma project easily would supply the looms of our country. On the small farm units each farmer could raise from three to five acres of cotton, his own family harvesting the crop. This would simplify the labor problem, give good returns, and allow a considerable acreage for other crops. The Agricultural Department has a limited supply of thoroughly acclimated seed which may be used by such farmers as are interested in this enterprise. Of interest in this connection is the fact that cotton was grown quite extensively in this region by the Pima and Maricopa Indians before the discovery of America.

The water supply is abundant and the lands, except in very limited areas, are practically free from alkali. The climate during the winter months is delightful. The summers are hot, the temperature sometimes reaching 120 in the shade. The sensible temperature, however, is not much greater than in Washington where the percentage of humidity is so much greater. Sunstroke is unknown. The nights are not uncomfortable, and a large part of the population sleeps out of doors the year around.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

ALASKA-YUKON-PACIFIC EXPOSITION

In work of construction, the Alaska-Yukon-Pacific Exposition is now virtually accomplished. Late in April the last nail was driven in the enormous United States Government building, and this ends the structural work of the fair. The task of beautifying the grounds and water front has been under progress for the past two years, and with the necessary final touches of paint and decoration everything will be ready for the opening day.

View Across Geyser Basin Showing Manufactures Building.

As it stands today, the Alaska-Yukon-Pacific Exposition is the most perfect example of exposition creating that has yet been presented. Its magnificent buildings have been placed in the heart of a primeval forest of Douglas fir, and the grounds overlook two fresh water lakes and the snow-capped peaks of three separate mountain ranges. Stretching from north to south as far as the eye can reach, lies the blue waters of Puget Sound and in the rare atmosphere of the great northwest the distances are shortened to the vision and the entire view is brought startlingly close at hand.

In building the exposition, a wide variety of architectural design has been employed; in its disposal there is to be noted no effects not in harmony with the general surroundings. The color scheme of the exposition is old ivory, and the effect of this subdued hue is pleasing and restful; it offers a strange contrast to the glaring white in which all former expositions have been clothed, and in its setting of dark green is especially effective.

In bringing the exposition to a finished state, ten million dollars have been expended on buildings and grounds, and the exhibits displayed in the many exhibition palaces will represent a value of over fifty million dollars. The United States Government will be a larger exhibitor than it has been at any previous exposition, and has not been asked for a single cent of appropriation for the enterprise.

Differing from former expositions, the Alaska-Yukon-Pacific Exposition will be ready for visitors on the day first set for that occasion, and on the first of June the gates will be opened to the public. There will be no unfinished work on buildings, grounds or exhibits, and the fair will be complete in every detail.

The principal object of the exposition is the exploitation of the territories of Alaska, Yukon and all those countries whose borders reach the shores of the Pacific ocean. In this object the exposition develops a new field of exploitation, and the varied interests of the lands whose resources are to be shown represent the most valuable field for commercial development there is on earth. The territory of Alaska is today only becoming known; the republics of South America are as far away to the American merchant and manufacturer as the heart of darkest Africa, and the Philippine Islands, a vast archipelago which has been under the Stars and Stripes for more than ten years, are almost as little appreciated as they were before Admiral Dewey passed Corrigedor and destroyed the Spanish fleet in front of the naval city of Cavite. Our other tropical possession, the territory of Hawaii, is without exception the most delightful land in the world, lying under the tropical sun; it is susceptible of as high development as any country on earth, and our people know but little about it or its resources.

The countries of Asia and the many islands of the Pacific are rich and valuable, and their commerce is in its infancy; their people are as interesting as their resources. It will be from all these countries the Alaska-Yukon-Pacific Exposition will draw heavily for new exhibits and will enable the fair to present a display which for interest and novelty will prove the most attractive yet offered.

In the race for commercial extension and the development of new markets, the manufacturing and commercial countries of Europe have early recognized the value of the exposition as a comprehensive means of entering actively into these developing fields, and as a result there will not be a single country of any importance whose interests are not fully represented. The Seattle fair will be a world's fair in the fullest meaning of the word.

No better comment on the Alaska-Yukon-Pacific Exposition as a method of exploitation is necessary than to note the interest manifested in it by our own government. In making the exposition, no financial aid was asked or suggested by the exposition management of the Government. When the exposition assumed definite form, the federal Government was extended an invitation to enter an exhibit, as was done with other countries and different institutions. In response to this, an appropriation of six hundred thousand dollars was made for the purpose of erecting buildings suitable for exhibition purposes, and the assembling of the Government exhibit.

Oregon State Building.

The Government group of buildings are six in number, and occupy the most commanding position on the grounds. Immediately at the head of Cascade Court, the enormous federal structure stretches for five hundred feet, and above it rises a graceful, gilded dome. On the right side looking down the court is placed the building in

which will be housed the Alaskan exhibit; opposing this is the Hawaiian building, and these two structures are identical in architecture. On the left wing of the main building is placed the Philippine building, and this is designed from a typé of building quite generally employed in Spanish buildings in the larger cities of the islands. Back of the principal building the Fisheries and Biograph buildings have been erected, and on the shores of Lake Washington the Life Saving Department will be housed, and here will be given the demonstrations of the methods employed by this wonderful department in the hazardous tasks of salving vessels and rescuing lives of men who have been met with wreck and disasters at sea.

In the exploitation of territories, the display assembled by the territory of Alaska surpasses by far any collection ever gotten together for exposition purposes. No land has ever undergone the changes in supposed conditions as has this country of the far North, and no other country has been more completely misunderstood in the past than has been Alaska. For a number of years Alaska has been known as a land of gold. It was generally supposed to be valueless beyond its mineral resources and the fruits of its fisheries. Even its mineral resources have been underrated, both as to the extent of its gold producing abilities and more particularly in regard to its diversified abilities in mineral production.

The barrenness of its interior has always held terrors beyond description, and its rigid climate was supposed to be unbearable. All this has become changed as men have discovered within the past five years, and a new Alaska has come to the front. This new Alaska is vast enough in area to afford room for a nation, and its food resources will produce sufficient to support the population of an empire. In climate, the interior of the country is no more severe than that of many of the northern states, and the north nations of Europe and Asia. Its agricultural resources are as varied as that of any part of the north temperate zone, and grains, food grasses and vegetables are successfully grown nearly to the Arctic circle. Its display of grown food products will show a complete and comprehensive collection, and for quality and quantity grown will compare favorably with any other land.

End of Agricultural Palace.

It will be along agricultural and grazing lines that the chief Government interest will be centered; not only will they be demonstrated by actual specimens, but will be further explained by means of lectures given under Government direction, by men who are thoroughly competent and who have devoted years of their life in studying Alaskan conditions and possibilities. These lectures will be made additionally complete by aid of moving pictures, and illustrated by paintings from actual scenes and enlarged photographs.

View Across Cascade Court Showing Oriental Exhibits Palace.

The Philippines exhibit will be made under direction of the federal Government, assisted by the insular government and liberal private enterprise. Its wonderful wealth of hemp, sugar, tobacco, cacao, timber, cloth and hundreds of other grown and manufactured articles will be demonstrated. Arts and crafts as practiced and developed by the natives, the types of houses in which they live, the various methods of transportation and the intricate system of irrigation as practiced by several of the untaught, non-Christian tribes will all be shown, and many other equally valuable and interesting features will be illustrated. The pearl fisheries of the Moro Islands will send their best divers and these will be sheltered in their swift, piratical "praos" and give exhibitions on the waters of the lakes.

The territory of Hawaii will be another exhibit conducted under care and direction of the home Government. No other country in the world has more delightful and valuable resources for exhibition purposes than the Hawaiian Islands. At the Alaska-Yukon-Pacific Exposition will be shown the finest and most complete collection of Hawaiian articles and products ever presented for inspection and comparison; it will embrace everything of note and importance made or grown in the islands. Old royal heirlooms, arms with which King Kamehameha overthrew his enemies and united the islands into the Hawaiian Kingdom, and all the quaint and picturesque features of old and modern native life will be shown. The world famous volcano of Kilauea will be reproduced in the most realistic manner possible with modern facilities, and this will constitute the most gorgeous spectacular event that has yet been produced.

The South American republics will have extensive representation in the Bureau of American Republics and in many instances by individual exhibits. The rapidly increasing importance of the Latin republics of our hemisphere is remarkable, and with the nearness of completion of the Panama canal are destined to a development of

wonderful extent. For the first time in exposition history they will receive careful and intelligent exploitation, and their exhibits will be bewildering in range.

The Imperial Government of Japan has made the most liberal appropriation yet allowed for foreign exhibition purposes, and this has been several times duplicated by individual and corporate enterprise. Japan's display will be sheltered in a magnificent building, constructed on architectural lines of one hundred years ago. A special commissioner has been in Seattle for several months, and on the opening day of the exposition the government will be represented by a high official of the nation. In the display of fine arts of Japan, the government has loaned for exhibition purposes a vast collection of art treasures that has never before been permitted to leave the shores of the country, and the exhibit will also show a number of scientific instruments and inventions which have not been displayed outside of the confines of national buildings.

In the Palace of Foreign Exhibits, every foot of exhibition space has been granted, and additional room has been made in order to accommodate the demands of foreign exhibitors. This magnificent building is one of the most striking on the exposition grounds and is located on the north side of the Cascades and faces the Oriental building.

One of the particularly valuable departments of the fair will be seen in the Department of Fisheries. This department will be housed in a building erected by the United States Government and will be wonderfully complete in detail. Its collection will embrace every known example of fish life found within the fresh water bodies of

Fine Arts Palace, One of the Permanent Buildings Which Will Revert to the University of Washington After the Exposition.

the United States, and the oceans of every latitude. The aquariums are enormous in extent and are so constructed that live birds will be seen flitting through glass receptacles, inverted in the tanks, and give the appearance of flying through the waters and among the fishes.

The Forestry exhibit will occupy the most characteristic building ever constructed for such display. In lines the Forestry building is strictly classic; it has a frontage of 320 feet and in width is 144 feet. The main columns are composed of 124 logs, forty feet high, and none less than five feet six inches in diameter. Each log weighs more than thirty tons, and has enough board measurement to build a family cottage. The main columns are in the rough and in placing them in position no bark has been removed. A balcony will be placed around the building on the interior for the benefit of sightseers, and each end is surmounted by a view tower. The building is permanent in construction, and at the expiration of the exposition will revert to the University of Washington.

No fairer scene can be offered any place than the outlook from the foot of the Alaska monument on the grounds of the Alaska-Yukon-Pacific Exposition. Standing directly in front of the great building of the United States Government, the enormous golden eagle on his towering perch of northern gold keeps watch and guard over the most perfect exposition city that has ever been reared. Under his eye is gathered the rarest collection of man's examples of skill and art ever assembled, and these find shelter in a magnificent group of permanent and temporary buildings whose architectural design and clever construction exemplify the very highest of man's inventive ability.

Get an Irrigated Farm

GREAT NORTHERN RAILWAY

An irrigated farm is the ideal one. No crop failure from insufficient rainfall, as you control the moisture and supply. Irrigated land produces three to five times what unirrigated land will. You don't require as much land—which means less work and more profit. Investigate now. Write for free booklet.

The United States Reclamation Service has in process of construction several projects involving an expenditure of nearly $20,000.000. All have reached a stage where water will be available this year, and the hundreds of new homes show that settlers are preparing to use it. The following projects are reached by the Great Northern Railway:

SUN RIVER PROJECT

The Sun River Project is located a few miles west of Great Falls, Montana. The total acreage to be watered is 276,000. This is all free government land, the homesteader having to repay the government only for the cost of constructing the works, which is divided into ten annual payments without interest. Fort Shaw, the first unit of the Sun River Project, is now open to entry. It contains 204 farms, ranging from 40 to 160 acres. **Send for Sun River booklet, mailed free.**

LOWER YELLOWSTONE PROJECT

This will water 66,000 acres of very productive land lying along the Yellowstone River in Eastern Montana. This land has been producing good crops for years, but irrigation will double the yield. Fully described in our booklet, **"Lower Yellowstone Irrigation Project," mailed free.**

WILLISTON AND BUFORD-TRENTON PROJECTS

Located in Western North Dakota. The water is pumped from the Missouri River into huge settling basins and then led off into the canals and laterals. Considerable land is for sale, as the owners have to sell down their holdings to 160 acres, the maximum amount permissible for one man to hold under the Reclamation Law. Splendid opportunities exist to get a valuable farm at reasonable cost now. **Booklet free.**

OKANOGAN PROJECT

Located in Okanogan County, Washington. About 7,000 acres of very fertile land is to be brought under the ditch in a short time. The soil is volcanic ash, the same kind that produces such wonderful yields in the Wenatchee Valley and other famous Washington fruit districts. An ideal section for the man who wants to own a ten or twenty acre fruit farm. Forty acres is the maximum amount of land for which water will be furnished. **Fully described in our Washington Bulletin.**

OTHER PROJECTS

In addition to the above, there are a number of projects promoted by private capital and enterprise. Most of these are in the rich fruit raising districts of Washington. The Wenatchee Valley, Kettle Falls Country, Spokane County and other irrigation centers are **fully described in our Washington Bulletin. Sent free on request.**

LOW RATES WEST

Special Round Trip Homeseekers' fares first and third Tuesday of each month during Summer and Fall to Montana, Eastern Washington and Northwest. Liberal stopovers. Round Trip Summer Tourist fares St. Paul and Minneapolis to Seattle, Portland and all North Pacific Coast Points $50.00; from Chicago $62.00. Write today for booklet which interests you, and full information regarding fares and train service.

MAX BASS
General Immigration Agent
220 S. Clark St., CHICAGO, ILL.

Alaska-Yukon-Pacific Exposition, Seattle, June 1–Oct. 16, 1909.
Rose Festival, Portland, Ore. June 7-12, 1909.
National Irrigation Congress, Spokane, Wash. Aug. 9-14, 1909.

CUT ALONG THIS LINE

MAX BASS, Chicago, Ill.— Please send me the following booklet:

TITLE OF BOOK.....
NAME.....
ADDRESS.....
TOWN.....
STATE.....

I. A.

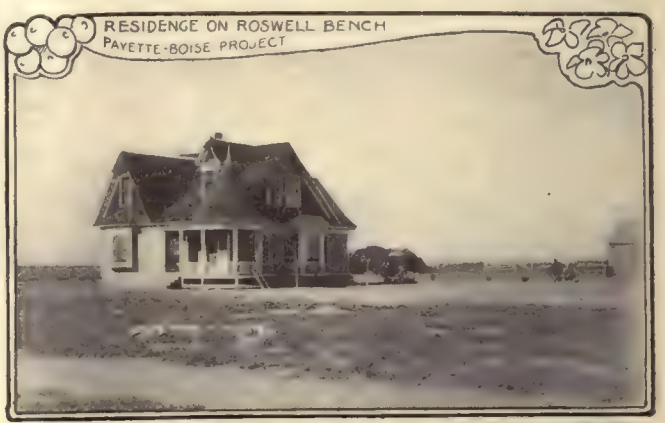
Payette-Boise Project

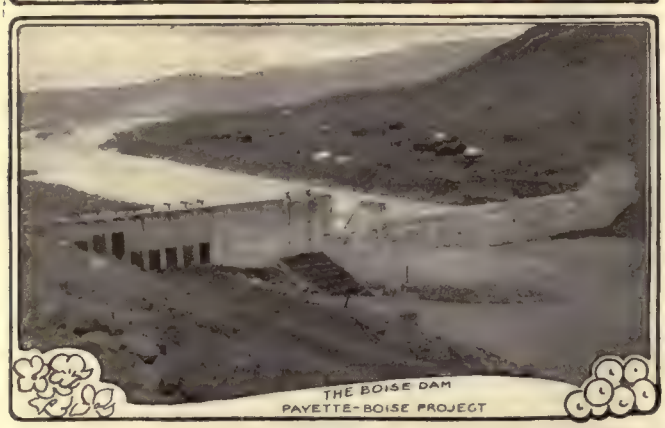
IDAHO.

An event of far reaching importance and marking the partial consummation of a plan to transform to agricultural uses the largest body of sage-brush land embraced in one project in the United States occurred reently in Idaho.

In the presence of a large number of settlers and residents of the valley the big headgates of the newly constructed government dam in the Boise River were opened and the pent up waters gushed into the broad canal.

For months the settlers on the south side of the project have been watching with deep interest the progress of work on this structure, for upon its completion





rested their hopes of an early and abundant supply of water. The dam is located eight miles southeast of Boise where the river emerges from its canyon. It is of cyclopean concrete founded on compact gravel. The spillway, or dam proper is 216 feet long, 50 feet wide at the base and 51 feet high. Along the down-stream toe of the dam and securely fastened to it is a timber apron. This apron is 50 feet wide and 13 feet deep on the lower side. It is built up of 12x12 timbers bolted together and the spaces between the timbers filled with rock and gravel. At the west end of the spillway is a logway four feet, lower than the spillway crest, and just west of the logway and forming the west abutment of the dam is the fish-ladder. This is of concrete, as are the tunnels, which were built for the purpose of diverting the river during the construction of the dam proper. These tunnels are closed by two 6 by 8 foot cast iron gates, and will be used when need arises for sluicing the silt from the reservoir. The main canal with a capacity of 1,500 second feet, heads at the extreme west end of the dam, and the water is taken through eight 5 by 9 foot cast iron controlling gates supported by concrete piers and abutments.

As the big headgates were opened and the life-giving waters gushed into the canal, the scene was viewed with varying emotions by the throngs gathered there. The engineers gazed with satisfaction at the beautifully finished structure; the farmers saw an abundance of water in their canals, orchards laden with fruit, and enormous yields of grain and alfalfa. But to the statesmen came visions of a new Idaho, an Idaho with possibilities unsurpassed by any state in all the golden West. They saw a home on every 40 acres of the project, a rural population of not less than 50,000 people, and 50,000 more people living in the cities and towns which have been growing by leaps and bounds since the initiation of the government system gave assurance of an ample water supply. From conservative estimates of a decade ago on the value of irrigated land and crops it took no complicated calculation to figure out that more than eighteen million dollars worth of taxable property in land values alone will be added to the wealth of the state upon the completion of the project, and that crops worth not less than six millions of dollars will be grown annually. Already new railroad lines are being built through the agricultural area, new mines are being opened, and the stock raising industry increased.

But let us follow the progress of the water taken from the Boise dam. The canal extends for 24 miles

to a point on Indian Creek above Kuna. This creek then carries the water for eight miles, when another canal 12 miles long carries it to the Deer Flat Reservoir. Occasionally along this route a smaller ditch diverts water to supplement the supply from other sources, but the principal function of this canal is to feed the Deer Flat Reservoir.

This reservoir was formed by building two long earthen dams in depressions between surrounding hills. The lower embankment, known as the Hubbard and Carlson dam, is 3,930 feet long and 68 feet high. It is 360 feet wide on the bottom, and a driveway 20 feet wide extends along the top. The upper embankment is only 43 feet high and 200 feet wide on the bottom, but it has a length of nearly a mile and a half, and the volume of each embankment is approximately 1,000,000 cubic yards. The process of construction was a marvel of modern engineering. Great steam shovels of the type used in digging the Panama canal tore gravel from the hillsides, two bites of one of the giant machines filling a car, while big steam plows dug up trainloads of clay, which were also dumped from movable tracks laid along the top of the embankments.

The plans for the project also contemplate the diversion of the waters of Payette River by gravity canals, and the utilization of the Snake River by pumping. The canal work is being done principally by the farmers, who receive therefor certificates which the government takes in payment of the building charge of the project.

The lands are generally smooth, with gentle slopes. The soil is volcanic, free from rocks, easily worked and rich in the necessary mineral constituents. The climate is delightful, the mean winter temperature at Boise being about the same as that of Fredericksburg, Va., although occasionally the temperature falls below zero for a day or two. The summers are long and warm, and with irrigation promote the most rapid vegetable growth. The lands produce from five to seven tons of alfalfa per acre each year, four to six tons of clover, fifty bushels of wheat and seventy-five bushels of oats. The surrounding mountains furnish large areas of grazing lands, and alfalfa for winter feeding is always in demand and brings good prices. But it is for its fine fruit that the section is becoming famous throughout the country, the apples, pears, and prunes commanding the highest prices in eastern markets.

The lands under the project have practically all been filed upon but many settlers will be compelled to dispose of their excess lands, as no water right will be issued for more than 160 acres. It is no wonder that these lands are being rapidly taken up, for the marvelous crop yields are becoming widely known. In 1904 a farmer who was brought up in one of the humid states in the Mississippi valley, cleared $1,200 from a three-acre apple orchard, and in 1907, the same orchard gave him a net profit of $750 per acre. One neighbor was clearing from $100 to $200 per acre on a prune orchard, while another was growing as high as 85 bushels of wheat per acre. Last year a number of his friends from "back home" moved to Idaho.

The development of power incident to the irrigation works will be of vast importance to the industrial development of the state. The dam on the Payette River, which will be 90 feet high, and well backed by storage in the Payette Lakes, will give practically unlimited power, while the Boise dam, opened today, will probably furnish power for municipal works, electric railways, and industries of various kinds. The completion of the project it is believed will result in laying the foundation for such an industrial development as probably has never been paralleled in the country. It means the expenditure in that locality of millions of dollars in a few years, the intensive cultivation of 400,000 acres of fine land; it means thousands of new settlers, the doubling of the population of the cities and towns in that portion of the state, an increased price for all agricultural products; better roads, schools, and churches.

But the significance of the recent celebration is not purely local in character. The completion of a unit of this great project only marks another milestone in the development of the West, and heralds to the world the beginning of an era of prosperity that has come to stay and that will be reflected in the increased prosperity in all lines of industry throughout the whole country.

HAYDEN LAKE COUNTRY.

One of the most beautiful valleys in the Spokane country is the district generally known as the Hayden Lake country, located directly east of Spokane and traversed by the Hayden Lake division of the Spokane & Inland Electric R. R.

Not many years ago this part of the country was undeveloped, with the exception of a few farms scattered here and there which were in a high state of cultivation.

Hayden Lake is perhaps the most beautiful of all the lakes in northern Idaho. It is surrounded by mountains and is located directly in the center of the United States Government Forest reserve. Hayden Lake is for this reason the most attractive summer resort near Spokane, and even before the electric railroad was built many people drove over to the lake by stage, preferring to go there because of its seclusion and natural grandeur. A few years ago, however, the land in the Hayden Lake Valley was purchased by a syndicate of Spokane real estate men and an extensive irrigation system installed. Since that time the valley has been developed to a marked extent and many attractive cottage homes may be seen along the line.

The Hayden Lake Valley covers an area of about ten thousand acres and it is safe to say that the development of this irrigation company embraces at least half of this acreage. The young orchards and improved five or ten-acre tracts are ample evidence of the unusual fertility of the soil and the abundance of water furnished by the irrigation company. Intensified farming in the Hayden Lake district is perhaps more profitable than in other parts of the country, for the reason of the unusual market afforded in the city of Coeur d'Alene. This city has a population of ten thousand people and is the gateway to the great Coeur d'Alene Mining country. A regular boat service connecting with steam lines direct to Wallace and other points in the Coeur d'Alene Mining Co.

Haydon Lake is the home of the largest poultry and squab farm in the Inland Empire. The success of the company owning this farm is unquestionably largely due to the favorable climatic conditions as well as the favorable market for all the poultry and eggs that can be raised. The farm embraces twenty acres and is in all respects a model farm. To visit the district from Spokane, requires but an hour and a half's ride. The trip may be made over the electric line, trains leaving the Spokane Terminal at convenient hours of the day.

$2.50 Will pay for the IRRIGATION AGE one year and the PRIMER OF IRRIGATION.

CYRUS H. McCORMICK.

A Word About a Great Man.

When men of ordinary attainments die, and their remains are laid away, the world giving them due thought for a day or so, soon forgets them.

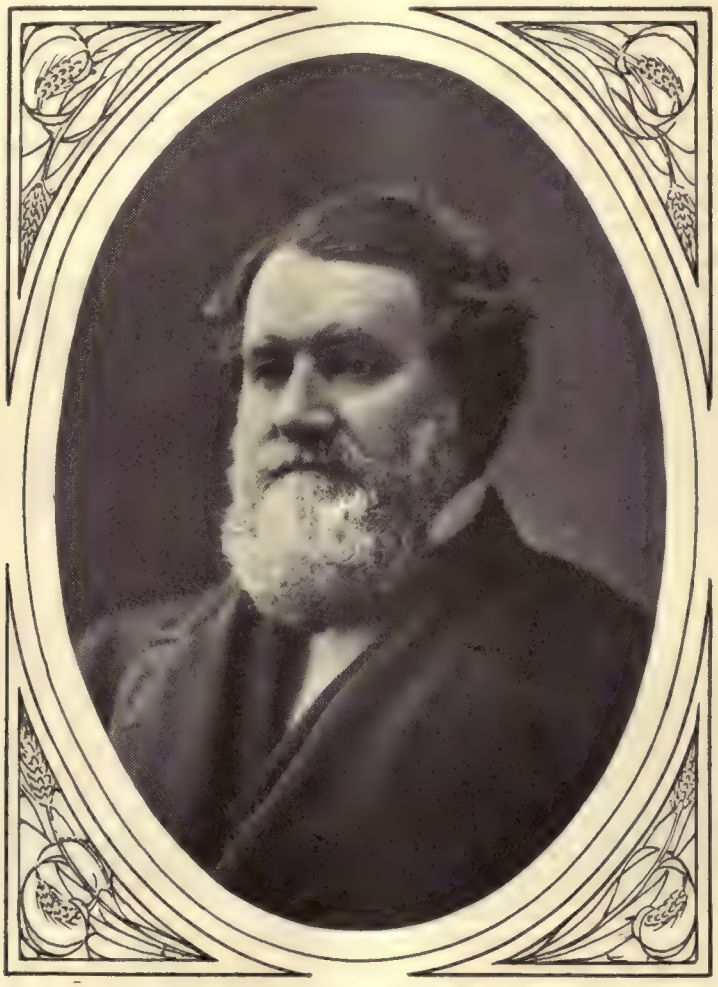
The term ordinary is used to describe the man who has made no distinctive, lasting success. To be sure, these men whom the average citizen would term ordinary, may have had as high aspirations and may have devoted as much energy and thought toward some great end as those who have died after having solved problems which immortalized them.

Men who achieve great success in the arts, in a mechanical way and in various lines which lift them to a conspicuous altitude in a commercial sense, win only by persevering effort.

A man dies, who has perhaps produced a wonderful painting which is the result of an inspiration. A composer, in an inspired moment, brings out something in the musical line which stirs the hearts of the world. Perseverence in delving for hidden treasures in the earth occasionally develops fabulous riches, and the proper use of that wealth may perpetuate the name of the individual. On the other hand, a misuse of it will send him to his grave "unhonored and unsung."

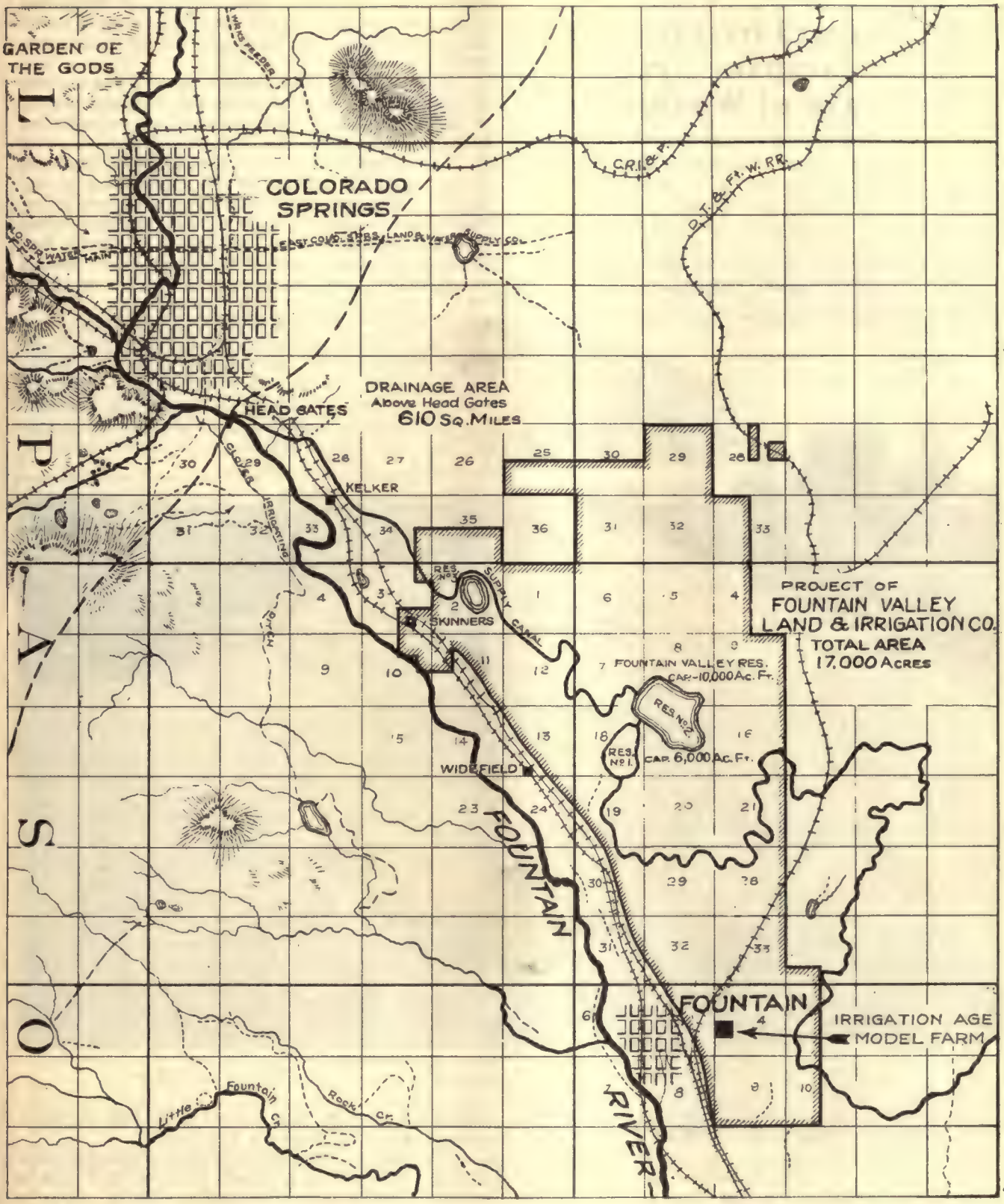
The genius of Edison and Westinghouse will for generations be glorified in the great inventions which their labors have given to the world. Among those whose genius contributed great labor-saving machinery to humanity and relieved of burdensome drudgery the greatest of all occupations—farming—the name of Cyrus H. McCormick must ever stand in the forefront.

We are presenting in this issue a half-tone likeness of Cyrus H. McCormick, the inventor of the Reaper. Much has been written and a great deal said concerning this subject, and THE IRRIGATION AGE is not disposed to try to outdo others in eulogizing him. It, however, offers these few observations in connection with the illustration, as a modest tribute to a man who came into the world, performed a great service to his fellowmen, honorably filled his place, and passed out, leaving the world a more desirable place in which to live.



CYRUS HALL McCORMICK,
Inventor of the Reaper. Born 1809—Died 1884.

This suggestion brings to mind the thought that there are very few men in the business world today, who having been left with such large fortunes and the care of immense business interests, have conducted themselves as well as have the sons of Cyrus H. McCormick. Chicago, and the country at large, may well be proud of the members of this great man's family.



FOUNTAIN VALLEY LAND AND IRRIGATION COMPANY.

The illustration above shows the location of the Fountain Valley Land and Irrigation Company's project near Colorado Springs, Colorado. The Editor of IRRIGATION AGE has purchased fifty acres under this system and will improve it as rapidly as possible. It is his intention to erect a comfortable cement house and barn this season. The entire fifty acres will be broken, leveled and sowed to oats this year. All work and improvements on this ranch will be illustrated and described in these columns from time to time. Many eastern and central states people have purchased land under this system. The climate of this section is equal to that of any in the world.

The Hanford Irrigation and Power Company Project in the State of Washington

When the first large irrigation projects in the Pacific Northwest were proved to be successful, making possible the reclamation of thousands of acres of arid land then worthless, enthusiasts coined this term:

"Irrigation is king."

Developments in the state of Washington during the past ten years have made certain the prophecy of the pioneers in irrigation. Irrigation is indeed king, in that the artificial watering of large bodies of arid and unproductive land has proved that by this means more wealth can be taken from the soil from a five-acre fruit farm in Washington than from an eighty or one hundred-acre corn or wheat farm in Kansas, Iowa, Minnesota or Nebraska, and with a tithe of the labor.

"Irrigation is king," again, from the fact that the government of the United States itself, as well as the people of all the states, have recognized the artificial watering and reclamation of the arid lands in the West as the most gigantic implement in man's hands for the uplift of the agricultural class, and for the production of enormous wealth from that vast region mapped thirty years ago in the school geography as the Great American Desert.

So complete has been the triumph of irrigation and so thorough has been the scientific demonstration of irrigation as the most modern method of production of fruit, grains, grasses and all agricultural products, that the United States government, through the reclamation service, is today engaged in the expenditure of the enormous sum of $50,000,000 in irrigation enterprises. This money, obtained from the sale of government lands throughout the West, is appropriated for the construction of masonry dams, tunnels, canals and laterals in irrigation projects known to be feasible and practical, existing in a half a dozen or more of the arid and semiarid states west of the Rocky Mountains.

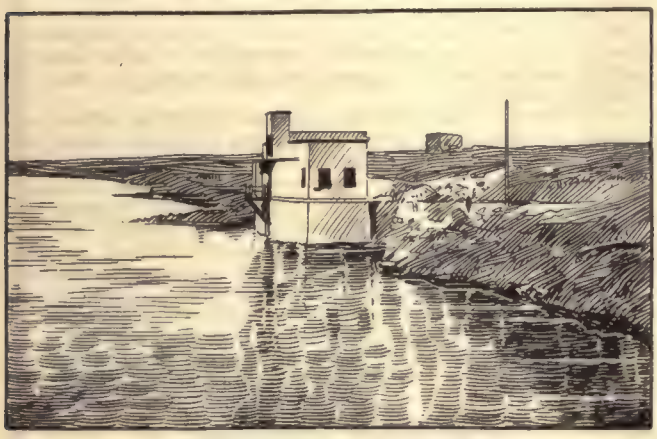
View of Main Canal—Hanford Irrigation & Power Company's Canal, Near Priest Rapids on Columbia River.

The state of Washington is most fortunately situated in respect to the profitable reclamation of arid or semiarid lands; more fortunately situated, there is every reason to believe, than any other state in the union. This is because of the fact that the irrigated farms of Washington have in addition to unsurpassed railroad and water transportation facilities, the best markets obtainable, namely, a dense urban population in Western Washington consisting of the cities of Seattle, Tacoma, Bellingham and Everett with a combined

population of upwards of 500,000 people, and Alaska, which is the best of all markets.

Competing systems of railroads in Eastern Washington enable the irrigation farmer in that district to cheaply market his products east or west—east to the mining camps of British Columbia in Canada, in Idaho and Montana and the cities of St. Paul and Chicago, to the west the cities of Portland, Ore., and those located on Puget Sound already named.

The Hanford Irrigation & Power Company's project is declared by the best informed engineers and expert irrigation farmers to be one of the most attractive and substantial of any throughout the entire Northwest. Located in the "Early Fruit Belt" of the Pacific Northwest—the basin of the mighty Columbia River—the Hanford project covers at present 16,000 acres of the richest and most productive land with two lines of railroads projected through it, one of which will be completed during the present year. At an expenditure of upwards of $500,000 the Hanford Irrigation & Power Company has completed its power canal, electric generating plants with a capacity of 3,000 horsepower, its pumping plant, pipe line, main canal and sufficient



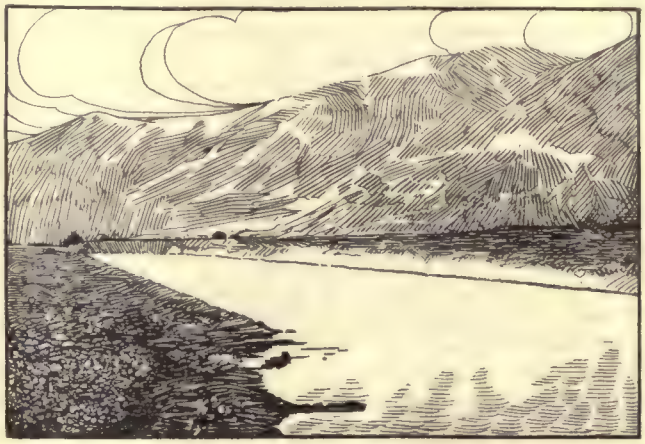
Pumping Plant of Hanford Irrigation & Power Company at Coyote, on the Columbia River.

laterals to water approximately 12,000 acres during the year 1909.

Major H. M. Chittenden, corps of engineers, U. S. A. (retired), until recently in charge of river and harbor work for the government in the Pacific Northwest, after a thorough investigation and examination of the sources of water and power of the Hanford Company located at Priest Rapids on the Columbia River, reported officially that it was possible to develop 100,000 electric horsepower to be used in pumping water from the Columbia River upon the intensely productive lands under the Hanford project. Acting on the expert and official report of Major Chittenden, known as one of the ablest engineers in the army, a company was formed in Seattle at the head of which was Federal Judge C. H. Hanford to develop the unclaimed power and irrigation resources of the rich Columbia River basin and the project is now practically complete.

The accompanying cuts show some features of the project. The water which develops the power to generate electricity is taken from the Columbia River at Priest Rapids, which power is from there transmitted sixteen miles down the river to Coyote Rapids to the pumping plant, which takes its water supply from the same inexhaustible river. Ample water is at all times available for the required power facilities, and the result is an abundant flow in the canals and distributing system.

Fruit culture has all the attractive features of outdoor country life, without the hard work incident to dairy or grain farming. You don't have to worry about

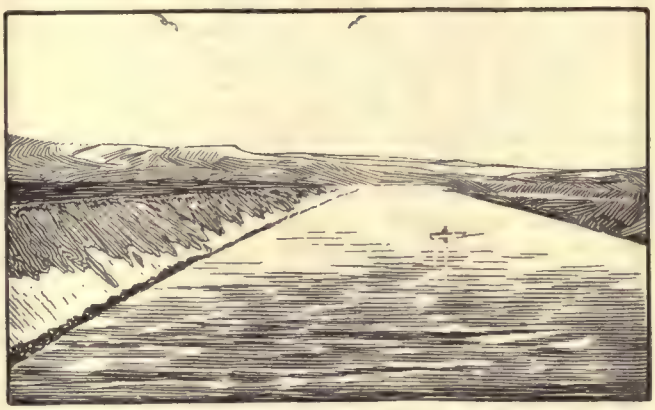


Another View of Power Canal and Hills near Priest Rapids.

too much or too little rain, because your orchard is irrigated and you control the moisture supply. As a healthful and productive occupation fruit raising has no equal. It is pleasant and does not require a great amount of capital to start. With a ten-acre tract you can live well and save money. Lands in the Yakima Valley, no more favored by climatic or other conditions, bring a revenue per annum of from $300 to $2,000 an acre. These figures can easily be verified and have long been well established.

It would be impossible for anyone to describe on paper the opportunities, the advantages and the pleasant features awaiting the industrious home builder that exist in the Hanford district.

The town of Hanford is beautifully located on the west bank of the Columbia River, thirty-five miles above



Close View of Great Power Canal, One Mile Long, 150 ft. Wide; Water 27 ft. Deep.

Pasco, and will be the largest town between the N. P. and G. N. R. R. It is growing rapidly and offers excellent opportunities in many lines of business.

The Hanford Company maintains an office in the Seattle National Bank building in Seattle, where detailed information regarding the project and the lands for sale can be obtained.

IDAHO, "THE GEM OF THE MOUNTAINS."

(Continued from page 227.)

The nights are generally cool and comfortable and during the hottest weather blankets will be needed for cover before the morning sun appears. In the Lewiston country there is an abundance of rainfall eight months in the year. Commencing about the middle of November, the rainy season sets in and continues, usually, until about the middle of July. From this time on until about the middle of November usually but little rain falls, which gives the farmers ample time to take care of their crops. Scarcely a month passes in this section in which the farmers are not able to plow at least a part of the time. Located at different points over the state are found natural hot springs, the waters of which contain various medical properties. No matter what the affliction, there seems to be a spring wherein are contained the necessary ingredients to effect a cure. The picturesque scenery of the Idaho mountains is unsurpassed and is attracting the attention of many people who seek health, rest, refreshment in the mountains during the summer months. The headwaters of the Snake river have already becomes the home of many people from eastern cities, who have erected beautiful cottages along the streams and who spend their summers breathing the health-giving air of this country, where the sun shines, in a cloudless sky, 300 days in the year.

The region covered by the State of Idaho has long been a favorite haunt for all kinds of wild animals that inhabit the mountain country of North America. The great range of mountains, that follow each other in close succession over the state, with the broad timbered slopes, cut by deep canyons and ravines through which flow sparkling streams of clear, spring water, opening into extensive lakes in many places, is an ideal spot for all fur-bearing animals and large game. The low lands are crowded with great numbers of wild fowls, and the streams are filled with trout.

Idaho is becoming famous for its extensive orchards and fruit products. The horicultural industry has made rapid strides and is now the most prominent branch of the agricultural resources of the state.

The valleys can not be excelled by any region in the United States for the production of apples, peaches, pears, apricots, plums, prunes and grapes; for sunshine and soil all combine to produce a growth and impart a flavor that is unexcelled anywhere.

Boise, the capital of Idaho, with a population of 16,000, lies in a beautiful valley of generous dimensions, fine resources and unlimited possibilities. It is located on the Oregon Short Line Railroad, 505 miles from Portland and 435 miles from Salt Lake City—this latter city being the supply point for all the rich mining camps and towns in southwestern Idaho — and over $2,000,000 worth of merchandise is hauled out by wagon each year from the wholesale houses there to the various mining camps. The water used for domestic purposes is obtained from artesian wells located in the foot hills above the city, and no system could be devised that would furnish a better supply of pure water. The hot water used for domestic purposes is also supplied from artesian wells that provide water heated to 170 degrees Fahrenheit. This hot water, besides being piped over the city and delivered to buildings and residences the same as cold water, is used for heating purposes; thus providing Boise with a convenience enjoyed by no other city in the United States. The Natatorium, a bathing establishment whose plunge and private baths are supplied with hot water from these artesian wells, is the pride of Idaho's capital, these waters, as shown by government analysis, having rare medicinal qualities.

America has now triumphed over Egypt and India in holding what will soon be the largest irrigated tract of desert land in the world. That is what is known as the Twin Falls country, in the State of Idaho. The ultimate area under irrigation when the entire Twin Falls project shall have been completed, will be 1,350,000 acres.

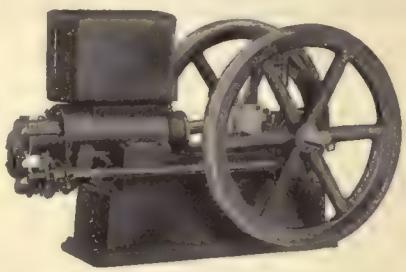
THE NEW HOPPER COOLING PLAN FOR COOLING GASOLINE ENGINES.

The well-known principle of maintaining a moderate temperature on gasoline engines has heretofore been through the use of a large water tank, or water pump, which has the disadvantage of increasing the weight, of being cumbersome, and of requiring a great deal of water for cooling.

It is necessary in a gasoline engine to have a circulation of water around the cylinder to prevent overheating and to maintain a moderate temperature to avoid ignition of the fuel before the proper time; this is why the water is used for cooling.

The new hopper principle consists of making a box-form hopper of cast iron, placing it over the cylinder, holding the water directly over the cylinder for cooling purposes. The principle of the teakettle again comes into effect. The open top of the cylinder and the open hopper permits evaporation; the steam condenses quickly, and comes in contact with the open air immediately, consequently water exposed to open air cools twenty to thirty times faster than water enclosed in a jacket, for that reason a hopper-cooled engine can be cooled with from twenty to thirty times less water than is used with the average engine using a water tank.

It reduces the weight of the equipment; saves the water; avoids draining or handling a large amount of water in



Witte Hopper-Cooled Gasoline Engine.

cold weather, and consequently, avoids the usual danger of freezing.

We show herewith a Witte hopper-cooled gasoline engine, made by the Witte Iron Works Company, Kansas City, Mo., which illustrates the simplicity of the hopper-cooling plan. In this case the hopper is built separate from the cylinder, so that it can be removed. The company will furnish a plate in exchange for the hopper any time the purchaser may desire to use the water tank principle in the place of the hopper. The side of the hopper is also arranged for pipe connections. The hopper-cooled engine has become very popular, and we are sure that article is of interest to all of those who contemplate the purchase of a gasoline or kerosene engine. Whether the engine is used in a shop or for outdoor work, the principle and the convenience has the same advantages.

Anyone expecting to buy a gasoline engine will do well to investigate all improvements, and in particular to write to the above company for description of their hopper-cooled engines.

Are You Satisfied With Your Position, Your Prospects or Your Bank Account?

Spokane and the Inland Empire of the great Northwest want men and women who have not ceased to be ambitious. To such, fame and fortune are waiting, provided proper effort is made.

We make it our business to help you to locate when you come. Our theory of life is, that if we make a special effort and study to serve our fellow men—the buying public—our business will prosper. When a person comes into our offices to buy real estate or to get located in some profitable business, it is our duty to see that he is located where he will "make good," provided he is made of the right kind of stuff.

The Inland Empire, with Spokane in practically the center, is rich with opportunities waiting for development. We make it our business to locate those who want real estate or any kind of a business.

City Real Estate—This department is in charge of thoroughly trained salesmen who are experts in their line. Whether it be a house, a lot, or income property that you are looking for, you will find courteous, intelligent treatment. Our listings cover all kinds of property and is complete in every particular.

Land Department—It is perhaps more difficult to buy land wisely here than in any other section of the country. No better land can be found under the sun than in the Inland Empire, but great care should be used to buy what is suited to your wants or condition in life. We make it our business to locate you to the best possible advantage, whether you want land for general farming or fruit raising.

We are not boosting any particular district for fruit raising. All have good points. We can sell you fruit lands in any of the well tested regions, and, in many cases, can save you money. Many additions and tracts are sold at prices that are entirely too high, in order to pay the promoters for the "hot air" methods of advertising necessary to make sales. We make it our business to study the different new tracts which are put on sale, and unless we are thoroughly convinced that the proposition is a meritorious one, we have nothing to do with it, and make no effort to conceal our opinions.

Business Opportunities—In a rapidly developing country like the Northwest, fortunes are often made in a few years by energetic men engaged in commercial enterprises. We make it our business to find the best openings in this line, as well as in every other department of the real estate business. This department is in charge of a highly trained expert, who has made a life study of his work. It makes no difference what line of effort you wish—general merchandise, hardware, groceries, manufacturing, hotels, etc—we have dozens of places that may be bought at prices that will pay you a handsome profit for your industry.

We don't want your business unless you have confidence in us. Before coming this way, if you will take the trouble to investigate our standing, it will probably save you time and money when you come. We would be pleased to have you write to the Trader's National Bank, Spokane,or will, on request, give you the names of dozens of satisfied clients.

Whatever you want—a home, a farm, a business, an investment, or a safe place for loaning your money on first mortgage real estate—we would be pleased to hear from you, and when you come to Spokane, be sure to give us a call.

We will guarantee satisfaction or refund your money.

The Hege Real Estate Co.

(Incorporated)

Spokane, Wash. **517 Sprague Avenue**

AMERICAN FALLS
THE SPOKANE OF IDAHO

American Falls, Idaho, is located on the main line of a great transcontinental railway system.

The falls are fed by the great Snake river and produce a minimum of 60,000 horse power, available for manufacturing and all purposes for which cheap power is used.

American Falls is surrounded by an extensive farming country, in the heart of one of the finest irrigated districts in the West, spilling over with natural resources.

American Falls is what Spokane was twenty-five years ago. The Spokane Falls made Spokane a large city. The American Falls will make American Falls a large manufacturing and distributing center.

The value of Spokane real estate is from fifty to one hundred times greater than it was a score of years ago. The increase in American Falls real estate will yield equally large profits.

American Falls offers exceptional opportunities for safe and profitable investment in land and property, and NOW is the time to take advantage of these opportunities. Correspondence solicited.

Address ELLINGER & STRUTHERS

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AMERICAN FALLS, :: :: IDAHO

IDAHO CONSOLIDATED POWER COMPANY
AMERICAN FALLS, IDAHO

Cheap Power for Manufacturing Purposes

We have 60,000 horsepower at American Falls which we are selling cheaper than any power on earth.

Located on a transcontinental railroad, offers best shipping facilities.

In the center of a rich agricultural and cattle country, which is being settled faster than any part of the West.

We solicit correspondence with manufacturers seeking a desirable western location. Manufacturing sites donated free to responsible manufacturing concerns.

IDAHO CONSOLIDATED POWER CO.
AMERICAN FALLS, IDAHO

Government Irrigation Work

HUNTLEY, MONTANA

This project has reclaimed about 30,000 acres of land located along the south bank of the Yellowstone River, in southeastern Montana. These lands lie between Huntley, at the junction of the Northern Pacific and Chicago, Burlington & Quincy Railroads and Bull Mountain Station, on the Northern Pacific Railway; these lines affording the best of transportation facilities. No farm in the project is more than two and one-half miles from a shipping point.

As these lands are a part of the ceded strip of the Crow Indian reservation, settlers will be required to pay $4 per acre to the Indians, one dollar at the time of entry and seventy-five cents annually for four years. In addition to this, the Government will charge the settler the cost of building the irrigation works, $30 per acre, payable $3 per acre per annum, for ten years; the payments may be made in five years if desired. The first payment of $4.60 per acre will become due when the land is filed upon.

The farm units vary from 40 to 80 acres, depending upon the location, and average 40 acres of irrigable land. Irrigated land in this section is worth from $75 to $200 per acre according to the state of cultivation and the crops grown. There are eight towns on the project at intervals of about five miles along the lines of railroad, and no farm under the project is more than three miles from one of these shipping points. Settlers are coming rapidly, and more than 200 have already began to improve their entries. There are about 300 farms open to settlement at this time. For details as to location and other information, address Project Engineer, Huntley, Mont.

The early history of this portion of Montana is noteworthy and interesting. The Yellowstone River was followed by Captain Clarke of the Lewis and Clarke expedition on his return from Oregon, and the Huntley project is especially honored in having Pompey's Pillar, which was one of the remarkable landmarks noted by the explorer and which has his name scratched on one of the rock faces under date of July 25, 1806. The pillar is a rock formation about 300 feet across, 150 feet high, and across the river from the bluffs. Pompey's Pillar stands with nearly vertical faces at the edge of the flat valley lands, and from its top a good view is had over the project lands and surrounding country.

After Clarke, the Yellowstone was a regular route of the Indian traders, trappers and pioneers from the Missouri. Later, steamboats made regular trips to the mouth of the Big Horn River, 50 miles below Huntley, and in a few instances as far as Huntley, at the mouth of Pryor Creek. Pryor Creek and the Pryor Mountains were named for a member of Captain Clarke's party. There were many exciting skirmishes with the Indians in this part of the state, and the scene of Custer's last fight on the Little Big Horn is visited by many people each season.

The preliminary surveys for the Huntley project were made in 1904; plans were developed during the following winter, and the first contracts advertised in the spring of 1905. The season of 1905 was occupied for the most part in location surveys, although some construction work was begun. In the spring of 1906, the Huntley flat presented an appearance of industry. There were contractors' camps, men, horses and machinery from one end to the other; 400 to 500 men were working for the various contractors and an engineering corps of 30 to 40 men was engaged in laying out the work, making up estimates for payment, and keeping accounts showing the cost and distribution of the work. The irrigation works are now all completed, and the forces of men and outfits have been succeeded by settlers who already far outnumber the contractors' men. Houses are going up all over the project, land is being broken by horses and steam plows, and water is running in all of the canals to the highest point on each unit farm, awaiting only the settlers' pleasure to run out over the land and insure bountiful crops.

The Huntley main canal is about 23 miles long, the heaviest work being on the first division, where three tunnels are necessary. The tunnels are 9.2 feet wide and 9 feet high inside, and are lined with concrete throughout. The canal at Huntley carries about 400 cubic feet of water per second, being a stream 6 feet deep, 20 feet wide on the bottom and 38 feet wide at the surface. The headworks, leading directly to tunnel No. 1, are designed to take water from the bottom of the river if necessary, and are of massive steel reinforced concrete. Practically all important structures on the main canal are of this construction.

Just below Ballantine, there is a drop in the main canal of 33½ feet, the power possibilities of which are availed of by the installation of a pumping plant. The machinery consists of two units, each comprising a vertical turbine with a centrifugal pump mounted on the same shaft and delivering water against a 50-foot head to the high line canal.

The project is divided into farm units containing from 30 to 160 acres total, of which 30 to 80 acres are irrigable land and the balance adjacent pasture or woodland wherever possible up to a total of 160 acres. The only wood lots are along the river, but most of the pasture land is along the main canal, where the farms can be extended above the irrigated ground. The lateral system is constructed to deliver water to the highest point of every farm, so that the whole system may go into operation this season if required and without delay or any canal construction by the new settlers.

The lands can be taken by homestead entry and commutation is not allowed, but soldiers and sailors may have their term of service deducted. There will be a building charge of $30 per acre, payable in not less than five nor more than ten annual installments, without interest, and an annual maintenance charge. This charge is 60 cents per acre the first year, and it is expected that it will be materially reduced in subsequent years. There is also a charge of $4 per acre for the land, payable $1 on filing and $3 in four equal annual installments beginning at the end of the second year, this for the benefit of the Crow Indians. Thus, a total first payment of $4.60 per acre is required at the time of filing. When the payments have all been made, the management of the canal system will be turned over to the water users, who will thenceforth operate and maintain it.

The feasibility of an extension of the main canal

to Bull Mountain and the extension of the high line canal to cover the lower Fly Creek valley has been established by preliminary surveys. It is probable that the extension work will be done by the farmers on a co-operative plan.

The farmer in this portion of the Yellowstone Valley is exceptionally favored by being on the main line of two transcontinental railroads, the Northern Pacific and the Chicago, Burlington & Quincy. These give direct access from the eastern, southeastern and central states to the project, and from the project direct to Minneapolis, St. Paul, Duluth, Superior and Chicago, southeast to Lincoln, Omaha, Kansas City, St. Louis and also south to Denver.

Another advantage of the Huntley lands is their proximity to Billings, the most important town in eastern Montana. Billings has a beet sugar factory costing $1,250,000, which is now engaged in working up the second season's crop of beets. The company pays $5 per ton for beets on board cars, and puts up a special loading stage wherever the acreage contracted will justify the expense. The average yield is about 14 tons per acre, but many farmers have obtained 15 to 20 tons per acre. There is also at Billings a creamery and a meat packing plant.

The elevation of Huntley is about 3,000 feet above sea level. The days are long and there is a preponderance of sunshine, the highest temperature in summer being about 100 degrees F. During the winter the mercury seldom drops below zero, and then only for a few days at a time, the cold spells being dissipated by the chinook winds from the west. The fall weather is particularly fine and is usually open until about Christmas. During about two months when winter weather is the rule, there is more or less snow on the ground, but there is seldom deep snow for more than a day or two.

Headgate of Huntley Reclamation Canal.

The forage crops do especially well, particularly alfalfa, which is raised in the Yellowstone Valley in large quantities for winter feeding of sheep and other stock. Alfalfa produces from 5 to 7 tons per acre from three cuttings, and on account of its forage value is one of the most important and valuable crops known, and also

Hotel Huntley, Huntley, Montana.

because it is used like clover and peas as a crop in rotation with grain, sugar beets, etc., to restore the fertility of the soil. Billings, Mont., is one of the greatest primary fat sheep and wool shipping points in the world. There is at present an extensive free range on both sides of the Yellowstone river, which is utilized by many stockmen. Large yields of grain are common in this valley, where proper rotation of crops is observed. After plowing up alfalfa land, a yield of 90 to 100 bushels of oats per acre, weighing 40 to 45 pounds per bushel, is not uncommon. New oats bring about 90 cents per hundred pounds, the price often rising to $1.50 in the spring. Good seed oats are now selling for about $1.75 to $2 per hundred pounds.

A rotation that is recommended is two years in grain, three or four years in alfalfa, and three years in sugar beets, the sugar beets being manured the second and third years.

Very fine vegetables are grown, including tomatoes and sweet corn, and there is a ready market in the mining districts for these products. In the year 1903 nearly every farm product was imported into Montana in large quantities. According to the state horticultural report, 1,475,600 pounds of onions, 1,645,039 pounds of cabbage, 10,374,387 pounds of potatoes, and 2,997,801 pounds of other vegetables were shipped into the state. There were also imported over 10,000,000 pounds of bacon and ham, 4,350,956 pounds of butter, 4,000,000 dozen eggs, 3,024,837 pounds of poultry, and so on through the list. Since the above statistics were gathered there has been an increase in

the home production and nearly a corresponding increase in consumption, so that, although the exact figures for the last year are not available, it is probable that the figures are not far wrong. Small fruits do well and are profitable on account of the excellent market. Apples and melons are grown successfully.

School at Ballentine, Montana.

The soil is exceedingly fertile and productive. A complete surface drainage system has been constructed throughout the Huntley project to prevent water-logging the land or the rise of alkali.

Wells vary in depth from 15 to 50 feet. The water in most cases is good. Deep wells have not yet been tried.

The water right for the Huntley project is perfect and includes water for irrigation, power development, domestic uses, and other purposes. The water contract provides for 2½ feet in depth delivered to all irrigable land. This is an ample amount, but in order to protect every farmer, no one will be allowed to waste water, such waste having ruined much land in other districts.

The water is taken from the Yellowstone River, which heads in the Yellowstone National Park and surrounding mountain ranges. Yellowstone Lake acts as a reservoir for the water, and the large national forests hold back the melting snows and keep up the discharge through the summer. These conditions insure plenty of water for all time to come. The river usually flows about 4,000 cubic feet per second at the end of the irrigating season in October, and the discharge runs over 30,000 cubic feet per second during the highest water in June.

There is not much large game near Huntley, but old buffalo horns corroborate the statements of "old timers" as to the herds of buffalo that grazed along the Yellowstone Valley up to early '80s. At present there are sage hens, prairie grouse, and ducks and geese in season.

The country affords wild currants, gooseberries, chokeberries and plums in many locations, and buffalo berries along the river.

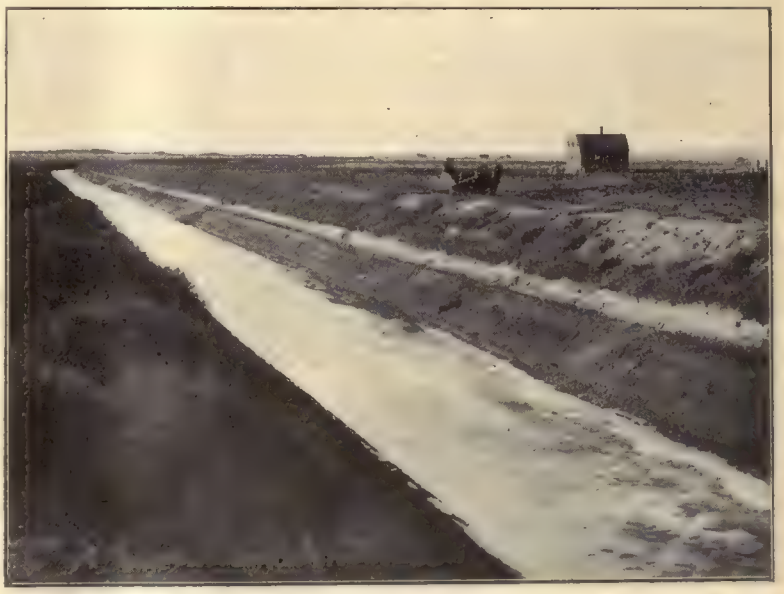
Government townsites have been laid out along the railroads at intervals of about five miles. At present, Huntley, located at the junction of the Northern Pacific and Chicago, Burlington & Quincy railroads, is the principal town, where are located the Government headquarters and offices, a school and a number of good business houses, including general store, a bank, hotel, etc. The townsites are laid off in 50x140 feet lots and streets 80 feet wide. The railroads have put in sidings at each town, and school reservations have been made. A portion of the lots in each townsite have been appraised and can be purchased outright at the Billings land office.

Osborn is well located at the mouth of Custer Coulee, about half way between Huntley and Ballantine. A store is now going up at that point. The farm units in this vicinity are being rapidly settled.

Worden is on the Northern Pacific Railway, about one mile from Ballantine, and, although just starting, has many possibilities even in comparison with the other towns.

Newton is on the Northern Pacific Railway, about five miles east of Worden, but is yet unsettled.

Pompey's Pillar is at the station of this name on the Northern Pacific Railway, which is named after the noted landmark. The townsite is at the end of the main canal as now constructed, and is situated on the bank of the Yellowstone River. Bull Mountain is at the lower end of the project lands, under the main canal, and is not likely to be more than a railroad station until the lands are settled.



Huntley Reclamation Canal.

In connection with several of these townsites, one,

two and three-acre lots have been laid off, so that water can be delivered to them. These places are suitable for a home with garden, orchard, chickens and a cow, at the same time being close to the business of the town.

A demonstration farm is already in operation for the benefit of the settlers of the Huntley project. This farm is under the management of one of the most successful agriculturalists in the northwest, and the results obtained and also the assistance and co-operation of the manager are available at all times to the settlers on the Huntley project.

Settlers taking homesteads should have enough money to make the necessary improvements, acquire farming outfits, and maintain themselves and families until they can harvest a crop.

In general, as a business opportunity for a "homesteader," the Huntley project presents as attractive a prospect as this country affords. It is strictly an irrigation and intensive farming proposition. It is difficult adequately to present to the farmer from the humid states the possibilities of rich soil where there is an abundant water supply and where the application of water to the soil is absolutely controlled. It is, in effect, the prevention of drouth, the control of the rainfall, the clouds and the seasons. When the difficulties of the average farmer have been removed, there is one great advantage enjoyed by the irrigator over his brother who relies upon the rainfall. This is in the fertilizing value of the water from the stream which is fed by mountain snows and springs. The water used for irrigation always contains more or less solid material both in solution and suspension, a considerable portion of which is composed of fertilizing elements. The process of irrigation always adds more or less fertilizing material to the land and in many parts of the world this has been found, year after year, and even century after century, to meet the needs of the most intensive farming. When this is understood, and the further fact that the fertilizing element of the soil in irrigated regions is not dissolved out and carried away by excessive rains, as in the humid regions, explanation will be found for the high value which irrigated lands, especially where an unfailing supply of water is assured, have always commanded. No farmer who has once practiced irrigation would willingly return to the pursuit of agriculture in a region where he would need to depend upon the natural rainfall.

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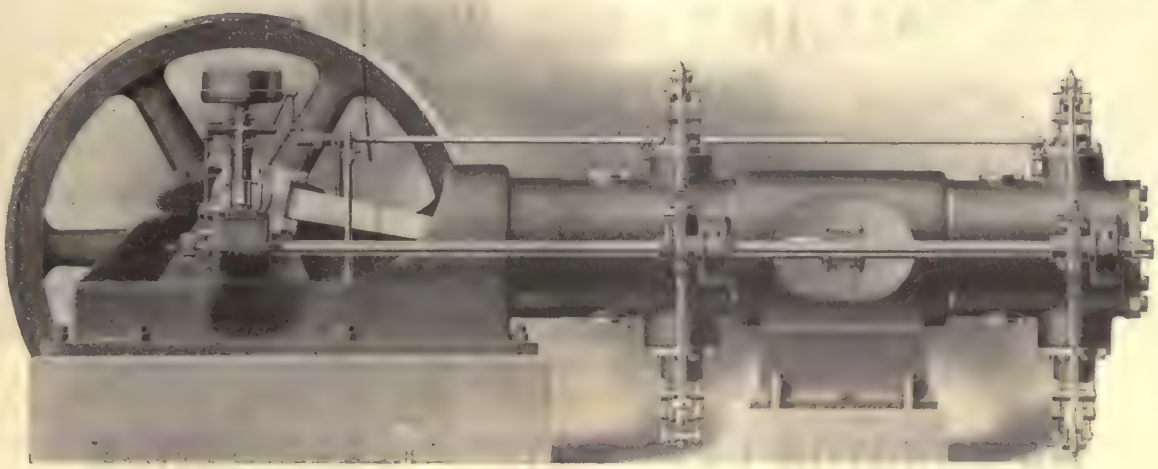
The BUCKEYE FOUR-CYCLE GAS ENGINE



SIMPLE IN CONSTRUCTION - ECONOMICAL IN OPERATION - RELIABLE
CATALOG ON APPLICATION

BUCKEYE ENGINE COMPANY, - - Salem, Ohio

IRRIGATION SUCCESSES OF THE WEST

A review of enterprises financed and developed by Gen. J. D. McIntyre, Seattle, Wash.

Prominent among the pioneers of irrigation enterprises is the record of achievements of Engineer J. D. McIntyre of Seattle, father of the great Gallatin Canal in Montana and the Sunnyside Canal of the State of Washington.

Starting into irrigation as a business in 1882 Mr. McIntyre has built over four hundred miles of irrigation canals and provided homes for over forty thousand families. This record completely overshadows that of any other single individual in the Northwest and is the result of unusual application of practical ideas and scientific construction of canals. It is a notable fact that all the tracts promoted and sold by Engineer McIntyre have not alone brought the purchasers thereof a good living and income, but have made them independently comfortable as well.

In the state of Montana General McIntyre organized five different irrigation companies within the short interval of eight years. Among them were the great Gallatin canal, the Big Muddy storage reservoirs, the Chestnut Valley canal, the Sun River canal and the Florence canal. In his state he organized the Sunnyside Canal Company at North Yakima, which was afterwards purchased by the Northern Pacific.

During the many years of experience in the development of irrigation enterprises Engineer McIntyre evolved the idea of planting and scientifically cultivating fruit trees on irrigated land, selling it to the investor or homeseeker in an improved and highly cultivated state. So successful has it proved to be that since Mr. McIntyre's plan became known many irrigated land companies have adopted it. This plan met with the instant approval of the investor, and today there is little doubt that anyone, after a thorough investigation, will admit that it is more advantageous to buy a five or ten acre tract carefully developed into a paying fruit farm by men who understand the business than to buy the raw land and go through the preliminary stages of planting the fruit trees and getting them into a bearing orchard. Mr. McIntyre is now exploiting, through the Interstate Trust Company, the sale of orchard land in the Rogue River Valley in southern Oregon. This district is the veritable paradise of America and has a climate exactly the same as Florence, Italy.

Here the Spitzenburg and Yellow Newton Pippin "winter apples" grow to perfection. The most perfect fruit country, choicest varieties of mammoth proportions, marvelous beauty and delicious flavor—the world for a market. Fortunes in apples, cherries, pears, lemons, peaches, English walnuts, grapes, pecans, watermelons, cantaloupes, tomatoes, sweet potatoes, endless varieties of fruits, nuts, berries and vegetables, ideal for poultry and bees. The favored summer resort for thousands of people—paradise for lovers of rod and gun. And here is the very place where the high-priced crops are raised and the bi- profits realized.

Land in five and ten acre tracts is offered for sale on the new plan—$2 down and $2 per acre per month. Three-fourths of purchase price and interest on deferred payments at 7 per cent from the fruit grown for you on your trees and vines, while you stay in your present employment till you are ready to take possession. The land is under cultivation, just awaiting your direction what to plant. That is, you never need more than $10 capital at any one time to own a five acre tract and you never have to pay more than one-fourth the purchase price. This is the greatest offer ever made.

Prices for land and water rights, $150 per acre. Planted to "winter apples" (selections the best), care for four years, $400 an acre. Planted to Spitzburgen and Yellow Newton pippins, cared for six years, $500 an acre. Planted with English walnuts, pecans, lemons, etc. (with fillers of grapes, cherries, pears, etc.), cared for seven years, $600 an acre. Remember, it requires special skill to grow an orchard scientifically and bring it to bearing successfully. Their wonderful plan is very simple. The buyer sends them $2 an acre for the amount of land wanted and $2 an acre a month. They select the tracts for buyers, and it is said no one has ever been dissatisfied with their selection. They even pay your taxes. You have nothing to do but to pay your little $2 an acre per month, and stop when you get one-fourth the purchase price paid in. The company does all the rest.

Those wanting further details should write to the Interstate Trust Company, 208 Boston block, Seattle, Wash.

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Nine miles from Terminal Station, at Trent Road, Wash.

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North of Otis Orchards.

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Twin Falls, Idaho

The rapidity with which the Carey act lands in southern Idaho are being reclaimed and settled, and the high class of settlers which they are attracting, prove conclusively the merits of the act. Within four years it has added approximately $10,000,000 in assessed valuation to the agricultural wealth of the counties in which the lands are situated. It has added 25,000 in population and $2,000,000 in bank deposits. It has been the greatest promoter of railway construction, electric power development, industrial progress and educational advancement. This remarkable development is accounted for in various ways.

The Famous Twin Falls of Idaho.

In the first place, it takes money to build irrigation works. The construction company operating under the Carey act must spend millions before it receives a cent. Preliminary estimates may be reliable, but the contingencies count up in the end. A little gopher may cost $1,000 in five minutes. You can scarcely figure the gopher as a contingency. He might turn out to be a badger, in which event he would cost more and cost it quicker.

Fortunately for southern Idaho, the men who first undertook the task of reclamation under the Carey act were men of means and determination. They succeeded

where men with less iron in their blood and backbone in their makeup would have failed. They were only obliged to issue a small amount of bonds, which left them free to carry on their operations as they saw fit, without being at the mercy of the bondholders. As a result they have not had a single foreclosure and not an acre has reverted to the company by reason of non-payment of interest or principal. Nor has a single entry been abandoned. This is a phenomenal showing, and it has made the Twin Falls country famous.

Another helpful feature was the way in which the original Twin Falls tract was settled. The officers of the land sales department brought in practical irrigators from the best irrigated tracts in the west. They knew Twin Falls had the land, the climate and the water supply, and they believed the project would appeal the stronger to those who appreciated these advantages. In this their judgment was sound. From the famous Yakima, Washington, country, came hundreds of practical irrigators. They were easy to handle and they are still on their Twin Falls land. They also set a splendid example to their less experienced neighbors, which was very beneficial. Colorado has since contributed its share of irrigators who, like their Washington brethren, sold their improved irrigated farms for from $300 to $3,000 per acre and took up raw land on the Twin Falls tract, which cost them $25.50 an acre, with a perpetual water right of the finest kind. These farmers can now sell their Twin Falls farms for $100 per acre and will ultimately make them as valuable as the fruit lands in Washington and Colorado.

To further assist in the development work, the Twin Falls company employed experts to show the farmers how to apply water to their lands. The farmers were organized into associations and drilled in the methods of water distribution best suited to their needs. They were told what to plant and how to plant. The duty of water was carefully explained to them, and as a result they got the right start.

The railroad followed the water on the Twin Falls tract and the settlers did not lack market facilities. An outlet to Nevada and California from Twin Falls is now under construction by the Harriman system, which will place the Nevada mining camps and the California seaports almost at the doors of the Twin Falls farmers.

The immense power sites on the Snake river in the vicinity of Twin Falls are now being developed and every town on the tract has light and power at rates which will permit of extensive use for commercial and domestic purposes. Industries are springing up. Mills, elevators, creameries, sugar beet factories, alfalfa meal factories are being built and the tract will soon become a large shipper of manufactured products.

The young orchards began to bear last year, when some magnificent peaches, pears, apples and cherries were grown. This year's yield of fruit will be considerable. Alfalfa seed from the Twin Falls tract has been shipped to Germany, the most critical market in the world. There is a good profit in alfalfa seed, and as alfalfa is the staple crop and the foundation for all other crops, it is bound to be a revenue producer. Sugar beets grown on the Twin Falls tract have yielded a higher percentage of saccharin than those from any other section of the West.

In keeping with the rapid settlement of the country has been the introduction of modern educational methods. In Twin Falls the children are brought in from a radius of several miles in school wagons. They thus enjoy the advantage of the city school, of which there are two in the city. One was erected last year at a cost of $65,000. The other cost $35,000, and both are modern in every respect.

All the other communities on the tract are supplied with excellent schools. Most of these schools are "centralized," comprising considerable territory, which is covered by wagons.

The roads on the Twin Falls tract are good, far better than the average in older settled communities, according to the statements of the motorists who blazed the trail for the New York to Seattle automobile race. The county has been liberal in its expenditures for roads and bridges, and the farmers have been active in keeping up their roadwork.

Each town on the Twin Falls tract has its Commercial club, all active bodies. These clubs co-operate when necessary, all working in harmony for the general good. Through their instrumentality several valuable industries have been launched and others are in process of incubation.

The secret of success on the Twin Falls tract has been co-operation and boosting. The knocker is not tolerated. His span is brief and he soon changes his song or leaves the country. This is well exemplified when any public movement is under way. Then the people band together in a solid mass, regardless of politics, religion, location or any of the elements which usually disturb farming communities. The co-operative sentiment is growing stronger and will be further strengthened when the canal system passes into the hands of the farmers at the end of the present year.

Twin Falls has profited from the experience of older irrigated sections and has drawn heavily from the best citizenship of these sections. The project has been a success because of the liberal policy adopted by its promoters. It is settled by the best type of Americans and is attracting that type only. Under such conditions it could not fail to develop and it has developed far beyond the most hopeful predictions of its well wishers.

H. F. Allen,
Secretary Twin Falls Commercial Club.

Bostrom's $15.00 Farm Level

Is used and endorsed by IRRIGATING FARMERS in every IRRIGATED District in the United States, Canada and Mexico. The few letters quoted below are conclusive evidence that this instrument fills a long felt want among IRRIGATING FARMERS for a SIMPLE and ACCURATE Telescope Level at moderate cost.

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C. L. Fitch, Greeley, Colo., writes: "I use the Bostrom Improved Farm Level No. 2, bought of you last November, on my irrigated farm for grading and running main ditches. It has already saved several times its cost and I regard it as indispensable to the irrigating farmer."

D. C. Bailey, Walcott, Colo., writes: "I have run a good many ditches with the Level I bought from you, and find it O. K. I am trusting it to run a ditch two and one-half miles long, which has the exceedingly low fall of 32 inches to the mile, and must be done accurately."

E. L. Peisar, Glenwood Springs, Colo., writes: "The Bostrom Improved Farm Level bought from you some time ago, proved more than I expected, and all farmers should own one and save the surveyors' fees."

E. C. Mace, Grand Junction, Colo., writes: "The Farm Level I bought from you last fall has proved to be very accurate and easy to operate. Have used it laying off irrigation ditches and laterals, also for clearing and leveling land. It will last a lifetime if properly taken care of."

F. W. Rieke, Sterling, Colo., writes: "I have used your Farm Level for running laterals for irrigation, also for drain ditches, and find it easy to manage and accurate."

IDAHO

L. D. Cowan, Caldwell, Idaho, writes: "I will send you another order for several Bostrom Improved Farm Levels No. 2 soon, as I know what your Levels are, and have found the manufacturers to be very satisfactory people to deal with."

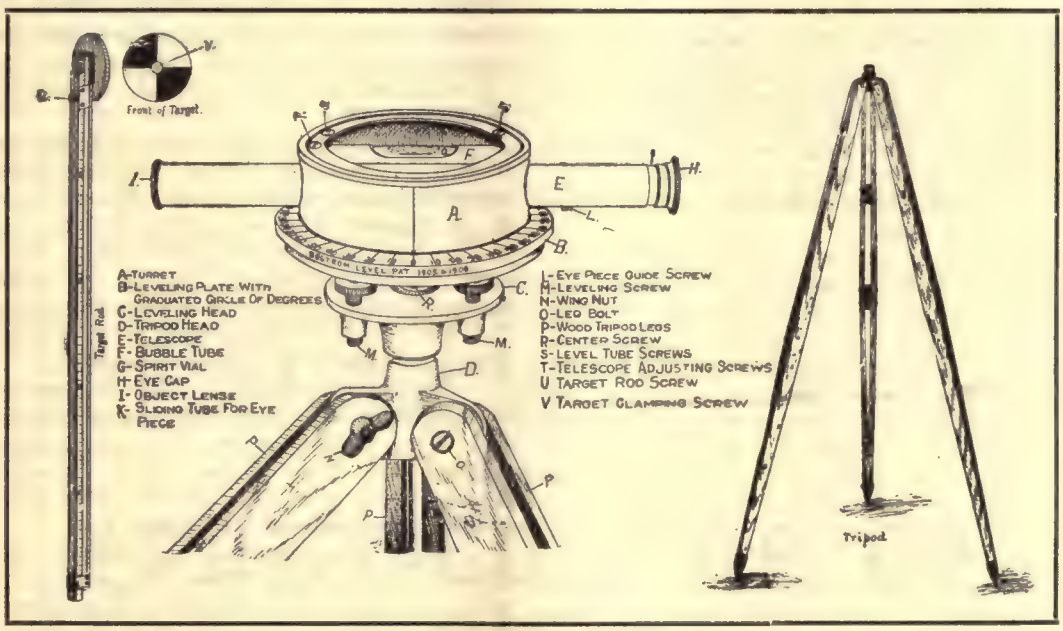
Frank Stratton, Mackay, Idaho, writes: "The level I ordered from you arrived in due time and I find it to be a reliable instrument. It does the work accurately and I would not trade it for any level I ever used, and I have used some high-priced levels."

SOUTH DAKOTA

Dr. H. H. Stoner, Highmore, S. D., writes: "It is with pleasure I am able to report that the Level which I purchased from you last February has proven eminently satisfactory. I have run main ditches and laterals in irrigation work and find it to be absolutely accurate."

NEW MEXICO

H. M. Foster, Clayton, N. M., writes: "The Level I bought of you has given the best of satisfaction. I use it for laying out ditches and leveling land for irrigation. I have recommended it to several of my neighbors. No doubt you will receive orders from them. I would not be without one at double the price. I consider it an ideal instrument for farmers' use."



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GARDEN CITY KANSAS and VICINITY

In the old reports and executive documents of the government, to be found in the library of the United States Senate, I came across the following passage:

"Nothing can exceed the dull monotony of a journey along the Arkansas. Neither in the character of the country nor in any department of science do we find a varniety in a day's march of twenty miles. The river bed is very uneven, the whole of which is a shifting sand."

On a preceding page of the musty tome I find this:

"The river is unusually high, being from 150 to 200 yards wide; and the Indians in crossing it, are usually seen swimming; while two years ago, at this season, I am told by officers of the army and others who were then here, that it was necessary to dig in the bed of the river for water to drink. The sinking of the stream during low stages of water is not peculiar to the Arkansas, as is well known, and it is believed that water can always be found in abundance by digging in the bed of this stream."

The above passages are taken from the report made by Lieutenant Beckwith, U. S. A., to the Secretary of War—who happened to be Jefferson Davis—as a result of the expedition undertaken by Captain Gunnison, who was killed by the Indians, and extending "from Pawnee Fork to the crossing of the Arkansas river at the mouth of the Apishpa, July 14 to August 2, 1853." The expedition was one of a series called "Explorations and Surveys to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean," in the years 1853-4, under authority of acts of Congress of March 3, 1853, May 31, 1854, and August 5, 1854.

These explorations and surveys are grouped together in another old publication of the government called "Geographical Surveys West of the One Hundredth Meridian." The one hundredth meridian of longitude ran through Dodge City, Kansas. It was the "deadline" of civilization so far as Kansas, and for that matter the Middle West, was concerned, for many years. The fact that the said meridian ran through Dodge City—the "end of the line"; the "end of the trail"; the "bad" town; the town with its notorious "Boot Hill," on which the temple of justice of the county of Ford now stands; the border of civilization; the terminus for some time of the Atchison, Topeka & Santa Fe Railroad—may or may not be significant in referring to the meridian as the "deadline" of civilization. But there is where the deadline was, and where it remained for many years. The Great American Desert in the old geographies included all of Kansas; but more recently it included only such portion of the state as was west of the one hundredth meridian of longitude.

"Nothing can excell the dull monotony of a day's journey along the Arkansas," says Lieutenant Beckwith in his report. Fifty-five years have passed since he journeyed up the Arkansas from "Pawnee Fork," or about Larned, westward through Kansas and into Colorado. He would not find all monotony if he were to renew his journey today; and the monotony that he would find would be that of the Valley of Contentment.

"It is believed that water can be found in abundance by digging in the bed of this stream," said Lieutenant Beckwith in 1853.

Something more than a half century after the lieutenant made his exploration through the upper valley of the Arkansas in Kansas, someone did "dig in the bed of this stream," and it was the government of the United States. It dug 23 wells, in all, and at various depths came upon water in abundance, which, today, is run into cement canals and sluiceways, being electrically pumped therein, and feed ten thousand thirsty acres of fertile Kansas land.

This digging in the stream; this series of canals and sluiceways constructed of modern cement; this system of electrical pumps, driven by one great central motive plant consisting of a pair of giant Corliss engines, comprise the Garden City reclamation project of the United States, soon to pass into the hands of the Finney County Water Users Association, by it to be administered under the watchful eye of the federal government. This is what has resulted from "digging in the bed of this stream," as Lieutenant Beckwith put it in his report fifty-five years ago.

But others than the general government have dug in the stream and found the generous waters of the subterranean recesses. Private enterprise has not accomplished so much in one undertaking as the government, nor has the finished product of the digging been so excellent, but practical results have been manifested to the end that many thousands of acres are now watered in abundance and alfalfa, sugar beets and garden truck spring from the soil and fill the space that was so "monotonous" to the exploring lieutenant back in 1853.

After painting a very harsh but what was, at the time, a very accurate picture of western Kansas and the upper Arkansas valley in a government report in 1895, F. H. Newell, then with little thought ever of being at the head of the great Reclamation Service of the government, that was to help in the regeneration of western Kansas, refers to the irrigation accomplished in the west end and particularly at and around Garden City, has something to say of canals.

Garden City blazed the way—it always has—in respect of irrigation, as it has in forestry and good roads and other typical reforms that are making a better country out of the upper valley. It established five canals radiating in different directions from the town and all doing service for years.

So Dr. Newell takes up this subject, and his discussion of it takes on a rather gloomy aspect, in keeping with what has been quoted from him above. He says:

"It was early recognized that the permanent occupation and development of much of this country rested upon the possibilities of obtaining water. Along the Arkansas valley a number of canals were constructed, those in the vicinity of Garden City being among the earliest on this stream, having priorities, it is claimed, even over many of the older ditches in Colorado. At the time these canals were built the Arkansas was supposed to be a perennial stream, and little, if any, doubt was entertained as to the ability to obtain water at all times and seasons.

(Continued in June number.)

5 Acres Enough. **20 Acres a Fortune.**

IRRIGATED FRUIT LANDS

in the Methow Valley.

The Methow Valley is situated on the Columbia River above Wenatchee, Wash., in the fruit belt which lies in the southern part of Okanogan County. It is a place where nature has outdone herself in forming a combination of scenery, climate and productive soil. The valley lies on the east slope of the Cascade Mountains, surrounded by towering, snow-capped peaks and has an average elevation of 1,500 feet above sea level. The Methow River winds its way through orchards and alfalfa fields and empties into the Columbia River at Pateros, Wash.

The unremitting sunshine of the summer months, and the natural air drainage of the valley, makes this spot ideal for residence, and it has been pronounced by experts as almost perfect for the production of first class fruit. The soil is a volcanic ash and sandy loam, and the land has a general slope to the southwest.

A shrewd and perhaps the best orchard man in the Northwest recently said in a public speech: "It's the sunshine, elevation and soil, together with the abundance of water and the climatic conditions, that give fruit in the Methow Valley its size, color and flavor. Okanogan County is certainly entitled to the 46 prizes it won at this year's Spokane Interstate fair."

The Methow Valley exhibited 20 plates at the National Apple Show, Spokane, Wash., Dec. 5 to 12, and received TEN prizes.

The Methow Canal Co. will sell you a five or ten acre tract planted to apple trees and care for the property for you until it becomes bearing.

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does not consist in putting in the cheapest gate. Price is not the only thing to consider. The cheapest headgate is the one which answers all practical requirements and which will last the longest. The cost of repairs year after year on an old wooden gate amount to more than the cost of a substantial iron gate.

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because they are machined to an absolutely water-tight joint and cannot leak. They will also save you water because they can be securely locked, either so that the gate cannot be moved at all, or so that only the amount of water the user is entitled to will be delivered, and at the same time permit the user to reduce the flow, or shut it off altogether, if desired. My locking device is the closest adjustable lock made. Northwestern headgates will save you repairs because they are so strongly and simply made that they cannot get out of order and will outlast half a dozen wooden gates.

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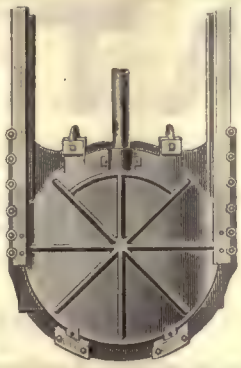

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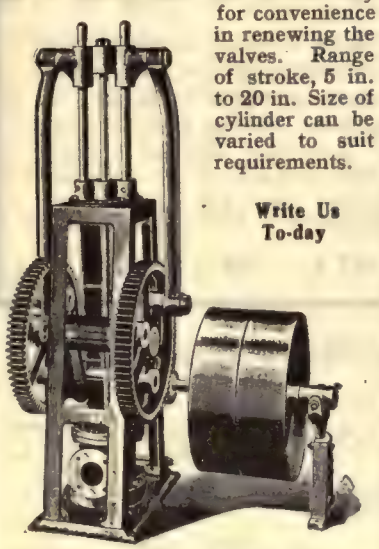

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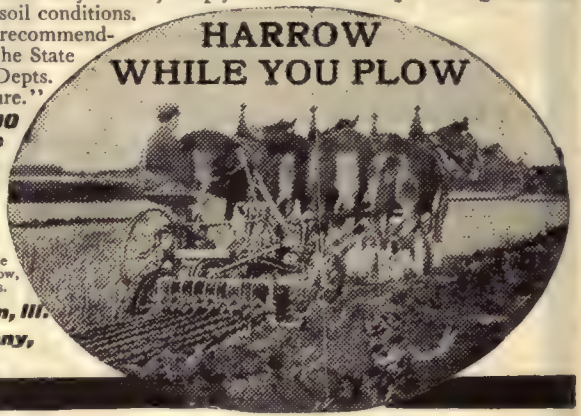

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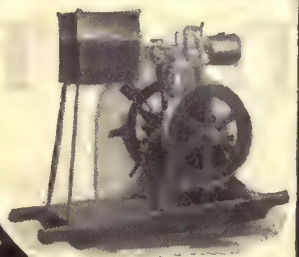

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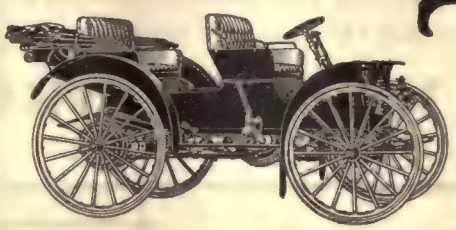

THE CAR FOR BUSINESS OR PLEASURE

The International Auto Buggy has come to take the place of the farmer's carriage or runabout and the driving team.

It is carriage and team all in one. And anybody who can be trusted with a team of horses can operate it with perfect safety.

The Auto Buggy is emphatically the vehicle for country road travel. It has every advantage that the family carriage or runabout has and many advantages which these vehicles do not have. It is always ready to go anywhere. Rough, muddy or hilly roads do not impair its usefulness.

When there is a trip to town to make, or other errand to do, it is not necessary to take the team from the plow or to stop the farm work. It does not require to be watered or fed. It does not get "fagged out" as the horses do on a long journey. You can go at a faster clip than you can with your driving team and you can keep it up all day long.

Perhaps the greatest feature about the International Auto Buggy is its simplicity and easy control. There is nothing complicated about it and any member of the family over ten years old can learn to run it in a very short time.

The Auto Buggy has solid rubber tires. There are no tire troubles. It is operated by a thoroughly reliable air-cooled gasoline engine. It is propelled by applying power to both rear wheels. It is chain driven. There are no cog wheels to break and put it out of action.

The Auto Buggy is a rare combination of both a pleasure and a business vehicle. The springs and comfortable seats make it easy riding. Passengers are protected from flying mud and water, no matter how fast the Auto Buggy is speeding. The rear seat and top may be removed, and the Buggy turned into a handy, light-running and capacious carrying vehicle. A ten-feed mechanical oiler makes oiling an easy matter. The tread is the same as that of a standard wagon. The seven gallons of gasoline which it carries is sufficient for a journey of 75 to 100 miles, making surprisingly cheap as well as pleasant transportation for its load of passengers.

The following letter is one of many we are receiving from all over the country, setting forth the complete satisfaction that the International Auto Buggy is giving:

New Brunswick, N. J., November 30, 1908.

INTERNATIONAL HARVESTER COMPANY OF AMERICA, Philadelphia, Pa.

Dear Sirs: You will undoubtedly remember that I placed an order with you the past season for two Autos, one of which I have been using for the past six months, and I have certainly given it some of the most severe tests that a motor car could be put to, and it has overcome all obstacles and meets my approval in every respect. I have driven the car up and down steep hills, through mud and sand, and the power of the engine and the excellent control one has of the car make it reliable and dependable at all times. I also like your high wheels, solid tire, and for my own use the in real estate business and for a selling agent, am convinced that your cars are the best of their kind on the market today. Yours truly, ALBERT SERVISS.

Take the matter up with the International local agent and get a catalog and further information. Or write the nearest branch house.

WESTERN BRANCH HOUSES: Denver, Colo.; Helena, Montana; Portland, Ore. Spokane, Wash.; Salt Lake City, Utah; San Francisco, Cal.

International Harvester Company of America, Chicago, U. S. A.
(Incorporated)

DALTON GARDENS

ACRE TRACTS

Two miles north of city limits of Cour d'Alene, Idaho, two miles south of

HAYDEN LAKE

The most important and strikingly characteristic feature of this district is the quality of its soil. It consists of a rich, deep, black sandy loam, being entirely different from the shallow, gravelly soil common throughout the Spokane Valley.

The fertility and productiveness of the soil at Dalton Gardens is unquestioned, either with or without irrigation, in the cultivation of fruits, berries, vegetables, clover and timothy hay. The soil throughout the Hayden Lake district is recognized as being superior to any other district in the entire Spokane Valley.

With its picturesque surroundings and two large, beautiful lakes within two miles of the tracts; its productive soil and perfect water supply, both for irrigation and domestic use, Dalton is the most attractive platted district in the Inland Empire.

Let us show you over Dalton Gardens tracts, at our expense. We have what we represent and know that it is the best on the market, and can, therefore, afford to pay the expenses of showing the lands to prospective purchasers.

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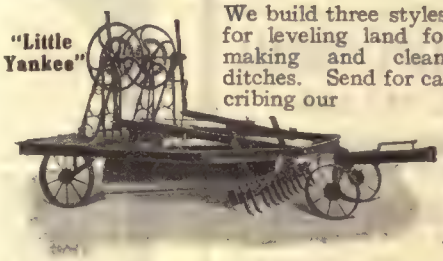
IRRIGATION LEVELERS and DITCHERS

"Little Yankee"



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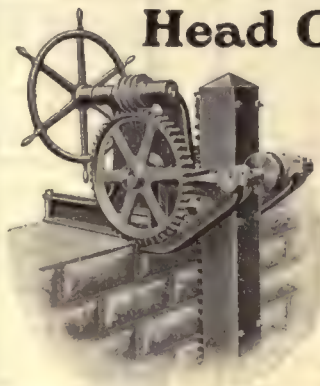

in all sizes and types for use in connection with timber or cast iron **Head Gates and Waste Gates** also a complete line of

Cast Iron Gates

Catalog No. 25 is devoted exclusively to Gate Hoists. We also build the **New American Turbine**

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for its equal. Wind power doubled. Two 14 ft. wheels work on same pinion; second wheel gives more power than first.

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In all winds. Develops 10 full h. p. in 20 mile wind. All power needed for farm, shop, irrigating, etc. Ask about our self oiling, self governed, single wheel pumper—also Armsaver Husker. Ask for book 60

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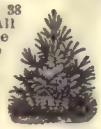

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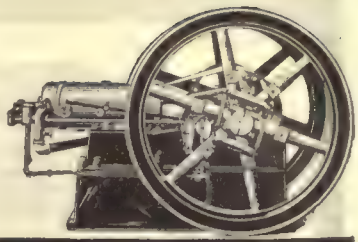
Send $2.50 for The Irrigation Age 1 year, and the Primer of Irrigation

A RELIABLE WATER SUPPLY FOR IRRIGATION



AFTER preparing the ground, sowing the seed and getting the crop well started, your greatest concern is for a reliable water supply. You *must* have water to irrigate in season. Your crop may be ruined in a single day for the want of it.

You have a dependable supply of water in the form of low lying lakes, ponds and reservoirs. The problem is to raise this water so you can apply it to the land.

Do you know that you can raise such water and make it available for irrigating all your lands by means of the powerful I.H.C. gasoline engines?

They will not only pump water for you in large quantities, but they do it economically. It costs practically nothing to keep an I. H. C. engine in repairs, and the expense of operating it is a very small item compared to the value of the crops you can raise.

An I. H. C. engine as the basis of your irrigating plant makes you master of the situation. You are independent of the ditch and ditch officers. You have a water supply that is all your own. You can start your engine any time and apply water to your land whenever the crops require it.

Keep an I. H. C. engine supplied with gasoline and it runs dependably, hour after hour, requiring but very little attention. You need return to the engine only occasionally, so you are free to spend practically all your time handling the water in the field.

One of the advantages in purchasing an I. H. C. engine is that the engine can be used for many other purposes besides pumping. It is a general all-round farm engine—an absolutely reliable source of cheap power for operating the grindstone, churn, fanning mill, feed grinder, separator, bone cutter, washing machine, etc. I. H. C. engines are made in many styles and sizes, so that you will be able to find just the engine you want. There are

I. H. C. Vertical Engines—made in 2, 3 and 25-horse-power.
Horizontal (portable and stationary)—in 4, 6, 8, 10, 12, 15 and 20-horse-power.
Gasoline Tractors—in 12, 15 and 20-horse-power.
Famous Air-Cooled Engines—in 1 and 2-horse-power.
Spraying and Sawing Outfits in various styles and sizes.

Call on the International local agent handling I. H. C. engines. He will supply you with catalogs and full particulars. Or, if you prefer, write to nearest branch house.

WESTERN BRANCH HOUSES: Denver, Colo.; Helena, Montana; Portland, Ore.; Spokane, Wash.; Salt Lake City, Utah; San Francisco, Cal.

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With Glass Valve Seat
A Line Without an Equal on the Globe
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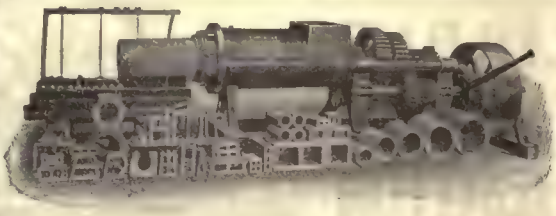
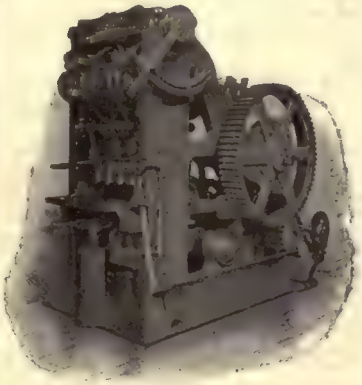
The Pump that PUMPS

HAY TOOLS BARNDOOR HANGERS HAY RACK CLAMPS



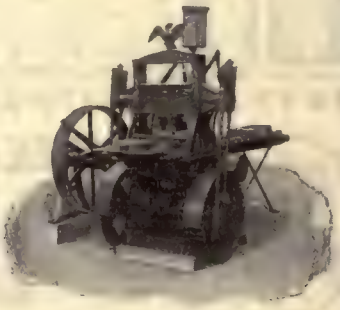
Centennial Auger Machine

Mascot Auger Machine



Dry Press, 5 styles

Wheelbarrows and Trucks



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"BUILT RIGHT—
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We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

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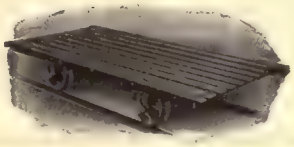
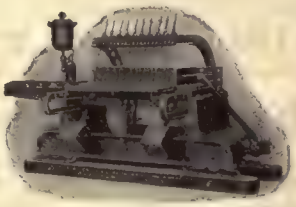
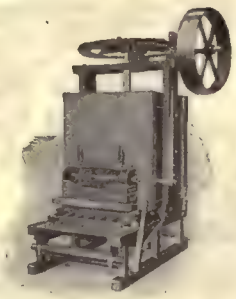


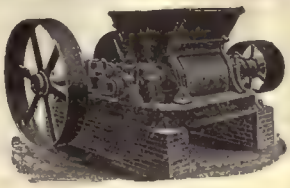
Dry Cars, all kinds



Hand and Power Cutters

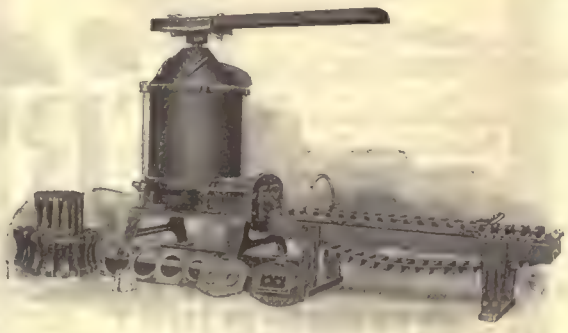


Soft Mud Machines, Horse and Steam Power

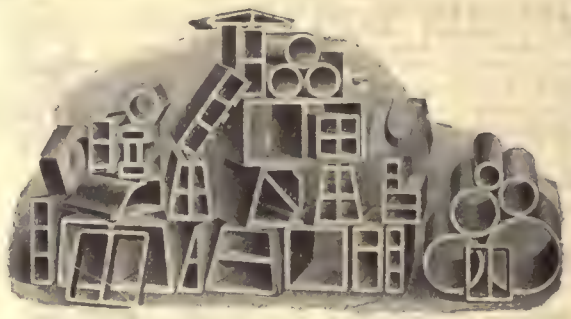


Disintegrators

Hand Power Screw Press



Horse Power Plunger Machine



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French Land and Irrigation Co.

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Unusual Opportunity

to obtain an *Irrigated Farm* in the *Famous Antelope Valley,* the *Garden Spot* of the *West.*

20,000 Acres now under Irrigation

The *Finest Climate* on the *Continent.*
The *Soil* as *fertile* as the *Valley* of *the Nile.*
Where *crops never fail* and always command a *good price.*
Where the *Apple* grows to *perfection* and *Alfalfa* is *King.*

DON'T FORGET this land is located in *Colfax County,* that took the *first prize* for *sugar beets* and *wheat* raised on irrigated lands at the last exhibition held at Albuquerque, New Mexico. Also REMEMBER that Colfax County took *first prize* for *apples* at the great expositions held at Chicago, St. Louis and Buffalo.

This Company also offers business and residence lots in the new town of French that present unusual advantages to the business man seeking a location in a new and rapidly growing town that is bound to be a WINNER.

Our prices reasonable and terms easy.

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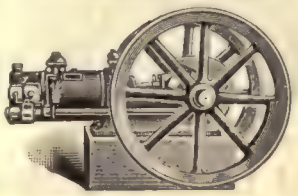
Are Reliable and Can Be Operated By Men of Ordinary Intelligence



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"Please send me a book of instructions on handling and running your gas producer and engine. I have been running this one on horse sense, but that might not work at all times. Plant works fine.

This man without special instructions, but with the use of "horse sense" causes his plant to work fine. There is a volume of praise for "OTTO" machinery in Mr. Witter's short letter.

The Otto Gas Engine Works
Philadelphia, Pa.

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The *Irrigation Age* has established a book department for the benefit of its readers. Any of the following named books on Irrigation and Drainage will be forwarded, postpaid, on receipt of price:

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The Primer of Irrigation, Anderson	2.00
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Irrigation for Farm and Garden, Stewart	1.00
Irrigating the Farm, Wilcox	2.00
Practical Irrigation, Aug. J. Bowie	3.00
Practical Design of Irrigation Works, W. G. Bligh	6.00
Irrigation (as a branch of engineering), Hanbury Brown	5.00
Earth Slopes, Retaining Walls and Dams, Chas. Prelini	2.00
Road Preservation and Dust Prevention, Wm. P. Judson	1.50
Practical Farm Drainage, Chas. G. Elliott	1.50
Drainage for Profit and Health, Waring	1.00
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At the OXFORD HOTEL, Denver, Colorado, you will find all the leading men interested in irrigation and all of its branches.
Denver is the logical irrigation center of the United States. You will find nearly everyone engaged in or interested in irrigation projects stopping at the Oxford Located half a block from the Union Depot: Fire Proof, Modern, European Plan and Popular Prices

THE HAMILTON-BROOKS CO.
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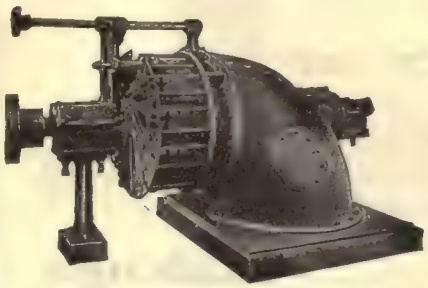

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When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the HIGH SPEED of the SAMSON, for a given power, lighter and consequently CHEAPER transmission machinery can be used.

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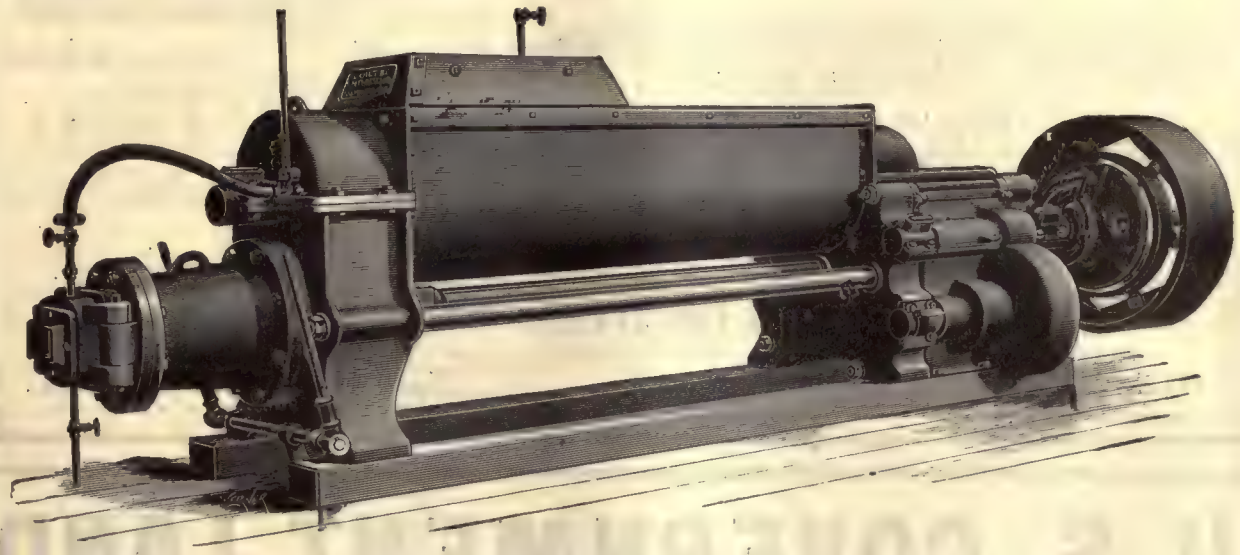

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The Arcadia Orchards Company is the largest commercial orchard proposition in the State of Washington—or for that matter, in the entire United States. The Company now owns about 7,300 acres of high-class orchard lands and expects to add 3,000 acres more as soon as possible.

This land is being cleared and planted to orchards, the purpose being to develop a system of great commercial orchards. When the orchards come to bearing, the Company can either operate the entire property as a commercial orchard or sell a part of the orchard tracts at current prices. The net fruit yield on orchard lands in any irrigated district of Washington will run from $200 to $1,500 per acre, and irrigated orchards anywhere in Washington sell at from $1,000 to $3,000 per acre.

The Company is capitalized on the basis of $1,000 per acre and 40,000 shares of its capital stock are offered to the public at $50 per share. This Preferred Stock bears 4% preferred dividends annually on its par value, $100.00, and may be exchanged for land at any time, on the basis of ten shares per acre.

FURTHER INFORMATION GIVEN UPON APPLICATION

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Hyde Block, **Spokane, Wash., U. S. A.**

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IN FAMOUS SNAKE RIVER VALLEY, IDAHO

(TWIN FALLS SECTION)

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ON JUNE 8, 1909

DO NOT FAIL TO REGISTER FOR THIS DRAWING

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WATER READY FOR DELIVERY, APRIL, 1910

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C. B. HURTT, Manager Land Sales Department, BOISE, IDAHO

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"SOLD—when You're SATISFIED"

That's the way Eckerle Pianos find homes for themselves.

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will be sent free and postpaid to you if you ask for it. Then in the quiet of your own home you can, by means of these beautiful photographs and complete descriptions, read and learn just how **well** Eckerle Pianos are made, why they stay in tune so long; why they last a lifetime; why they always satisfy, and why it is called the "Piano with a Soul." This book takes you on a trip through one of the largest and best equipped piano factories in America, and explains clearly why Eckerle Pianos are **better** than other moderate price instruments. There are thirty-four of these important reasons which you should know about, scattered along the journey from lumber yard to shipping room. Send for this Art Color Catalog today. It shows our new 1908 styles in colors, quotes lowest freight-paid prices, explains our 4 different plans of payment, and tells you in the words of other buyers just what they have found the Eckerle Piano to be.

After you have read this book

through and talked the matter over with your family, you can take advantage of our fair and square **"Sold when you're satisfied"** offer, and we will deliver to your own home, freight and delivery charges paid, the style of Eckerle Piano you prefer, and let you give it a thorough 30 days' trial. Play it yourself; let your children try it; invite your musical friends to play on it, and when the 30 days are up, let us know whether the Eckerle—"The Piano with a Soul"—has found a home with you. You take no risk whatever in trying the Eckerle Piano in your own home, and we take but very little risk in making you this offer if you are really seeking earnestly for the best piano at a moderate "Factory to Home" price. Write a postal or a letter right now and ask us to send you the Art Color Catalog of the Eckerle—the piano that is not considered sold until you are fully satisfied that it is **the piano you want to place in your home.**

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Capital $1,500,000 CHICAGO, ILL.

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Only $37.40 and up for complete steel mill and steel tower. Aldoco Mills run smoothly, quietly, and easily, and require but the slightest breeze to set them in motion. They have solid tool steel wrist pins, and a special Rocker Arm Device. Our steel towers are strongly braced, well proportioned and fitted with ladders. Every mill fully guaranteed. Write us.

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Complete 8-foot wheel and 30-foot tower, total weight 940 pounds. Price.....$37.40

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Complete 8-foot wheel with 40-foot tower, total weight 1130 pounds. Price.....$43.85

No. 13 D I A-7702-20.
Complete 10-foot wheel with 40-foot tower, total weight 1260 pounds. Price.....$51.05

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90 Days Trial

A $60.00 Machine From Factory to Home for $17.95

The most wonderful offer we or any other house has ever made on a strictly highest grade ball bearing drop head sewing machine. Do not class this machine with the ordinary drop head sewing machines which you can buy anywhere at $25.00 to $35.00. At $35.00 this machine would stand alone as one of the greatest values ever presented, and now when we cut the price in two and ask only $17.95 for this beautiful piano-polished quartered oak case, with carved front and round corners, and this high arm automatic head fitted with best ball bearings and equipped with stitch regulator, double feed, spring tension, cylinder shuttle and automatic bobbin winder, also include a full set of attachments and accessories, the offer becomes the sensation of the season in sewing machine values. You don't need to take our word for it, but trust to your own judgment after you have tried the machine in your own home for 90 days. Order this machine on 90 days trial; use it alongside of any $60 Agency Machine made, and if you don't prefer the new Albaugh-Dover model No. 5D-12 machine, regardless of cost, send it back and get every cent of your money. You take no risk whatever. We can make quick shipment. Order today on 90 days trial. **PRICE $17.95.**

Albaugh-Dover Co., 905-938 Marshall Blvd., Chicago, Ill.

MORE MONEY
From Your Cows and Much Less Work In Getting It.

If you could see the Real "DIFFERENCE" between the NEW BUTTERFLY CREAM SEPARATOR and any other made—**Difference** in amount of the cream you get; **Difference** in the quality of cream; **Difference** in the way the machine runs. **Difference** in the number of times a minute you have to turn the crank; **Difference** in the way the milk is aerated and purified while being separated; **Difference** in the time and trouble it takes to clean the skimming device—you would say, as hundreds of others are saying today—"I'll get the NEW BUTTERFLY CREAM SEPARATOR."

If you could see how to make easily $10 to $15 more a year on each and every cow you keep, and still do it with less work for your wife and yourself, you'd say: **"I'll get a Cream Separator."**

OUR PATENTED ALUMINUM CORRUGATED SKIMMING DEVICE

makes the New Butterfly Cream Separator **different and 8 times as efficient as any** other machine. Every drop of milk that enters the bowl of the New Butterfly Cream Separator is actually put through the skimming process **8 times.** This guarantees complete separation, and you can't fail to get **ALL THE CREAM.** New Butterfly Cream Separators are sold as they ought to be. Not by agents, but direct from our factory to your farm **Freight paid and on 365 days' trial.** Send today for illust'd catalog.

For average use, we recommend ***No. 4½****, capacity 450 to 500 lbs. of milk per hour.*

PRICE delivered at your town— **$39.80**

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A Complaint

from one of the largest buggy manufacturers in America.

In a private letter recently addressed to the Albaugh-Dover Company he makes this complaint, and appeals to us to raise our buggy prices.

"Your prices are too low. We do not believe there is any other catalogue in existence (and surely no retail dealer or agent) selling a buggy as well made as your 14D-116, for instance, for less than $60.00, while your price is $50.00."

We call that a pretty convincing argument, and one that should mean more to you if you are going to buy a buggy, than all the extravagant claims made in the most beautiful colored catalog ever written. This letter proves that when it comes to buggies, **we are acknowledged privately by other manufacturers themselves to be leaders in price and quality.** Why shouldn't we tell you about it? You ought to know it, too.

We Make a Specialty of the Best Low-Priced Buggies in America

as well as the higher grades. No matter what kind of a buggy you want to buy, if you haven't gotten our catalog and price list you haven't struck **"rock-bottom" in buggy buying yet.** Our rigs are stylish, up-to-date, strong, and built **right from top to tire.** Above all, the price in every instance is as low as the quality of the job and our small profit will permit. Send today for our catalog and see for yourself why other manufacturers are complaining about our low "Factory-to-User" prices. Runabouts **$21.50 to $62.00.** Top buggies **$28.50 to $110.** Surreys **$56.50 to $110.** **We have 35 styles of Top Buggies priced from $40 to $60.** Among these you are sure to find just the rig you want at a price much less than you have expected to pay. Every buggy is covered by our "Iron-Clad Guarantee." Write for catalog.

ALBAUGH-DOVER CO., 915-9 CAPITAL $1,000,000 MARSHALL BOULEVARD **CHICAGO, ILL.**

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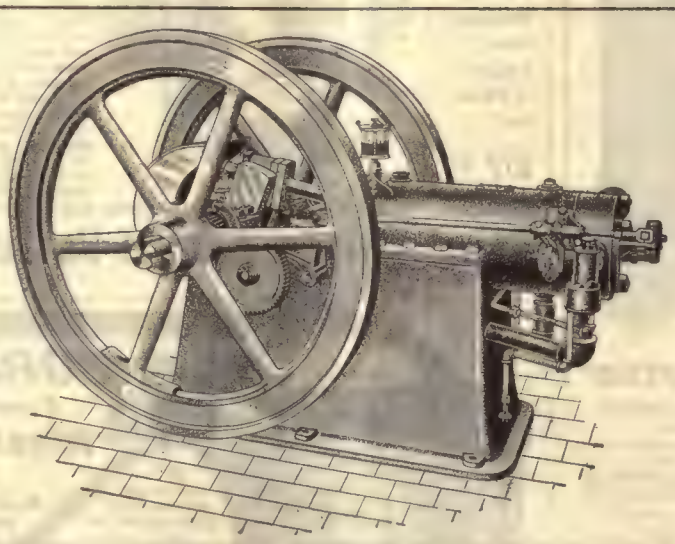
"Dempster" — That's The Name

High Class
Gasoline Engines

2 to 12 Horse Power

For Gasoline Kerosene and Alcohol



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Economical
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Anything
Anywhere

Irrigating and Water Works Pumping Plants our Specialty

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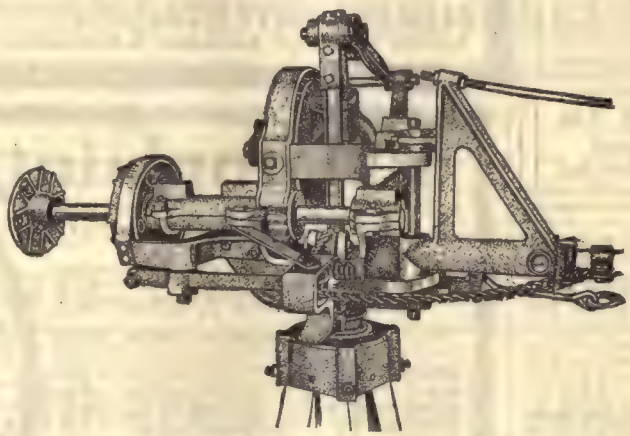
GRAIN DRILLS — IRON PIPE AND CASING — COCKS AND VALVES
WELL POINTS AND STRAINERS — FARM AND RANCH WATER SUPPLIES

BEST TO BUY —— BEST TO WORK

Look Carefully at the Best
Windmill Head
Ever Made



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Extra Bearing
on the Wheel Shaft and the
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and other good things

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FACTORY: BEATRICE, NEBRASKA

Branch Houses: Omaha, Neb. Kansas City, Mo. Sioux Falls, S. D.

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A Place Where Life is worth Living

17 Miles from Spokane
2000 Acres of Fertile Soil
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Sold in Five and Ten-acre Tracts
Long Terms
Every Foot Can Be Cultivated
In Good School District
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All kinds of Fruit can be raised
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It's the Place to Live.
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In fact, Spokane Orchards is all that is required for Home, Health and Wealth

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335 Sprague Avenue
Spokane, Wash.

The Livest Spot on Earth Today!

SOUTHERN IDAHO

Twin Falls North Side Land and Water Company

W. S. KUHN, President

Thousands of Eastern people are moving into the Twin Falls country to make their homes and to prosper under irrigation. They have first satisfied themselves that Southern Idaho offers them the greatest opportunities. No matter what they may turn their hands to they will prosper. It is a great apple country, a great potato country, a great onion country, a great alfalfa and dairying country. All the fruits, grains, grasses and vegetables of northern latitudes yield abundant crops in the Twin Falls country.

With irrigation the crops are sure. In southern Idaho the volcanic ash soil is very rich, sunshine is perpetual during the growing season and the water supply from the great Shoshone or Snake River is always abundant. The settler takes up the land under the Carey Act and is protected by the state. The irrigating company constructs the irrigating works and turns them over to the land owners to own and operate. No investment can be more safe, no arrangements more fair and equitable.

The Kuhn interests are developing electric power now at Shoshone Falls and are putting in another plant at Salmon Falls, and the rate is the same as charged to large consumers at Seattle. The lowest rate in the west.

This power in itself will be a factor in the quick development of the Twin Falls tracts. Many buildings on these tracts are now heated and lighted by electricity. Everyone will appreciate what this abundant and cheap power means for developing this area.

The irrigating company employs experts to assist the inexperienced and operates farms for the benefit of the settlers. You will find yourself in the hands of your friends, who are interested in your welfare if you settle in the Twin Falls country of southern Idaho.

Approximate acreage of tracts:

Twin Falls South Side Tract - - - -	240,000 acres
Twin Falls North Side Tract - - -	180,000 "
North Side Extension or Clover Creek -	40,000 "
Twin Falls Salmon Tract - - - - -	125,000 "
Contemplated Extensions - - - - -	150,000 "
Total	735,000 acres

The towns of Milner, Hillsdale, Jerome, Wendell, Gooding and Hollister all offer unusual opportunities for business and successful home-making.

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H. L. HOLLISTER

Home Insurance Building

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THE
IRRIGATION AGE

VOL. XXIV — TITLE REGISTERED U.S.PATENT OFFICE — Nº 8

CHICAGO, JUNE, 1909

THE CONTRACTOR Digs the Specified Ditch

within a fraction of an inch in size and shape, and within a fraction of a cubic foot in material removed, when he uses an AUSTIN DRAINAGE EXCAVATOR and he performs the task in one operation.

What of it? Just this. **The Engineer** gets a ditch which satisfies every scientific requirement of a perfect ditch. **The land owner** gets a ditch which in appearance, durability and capacity is the most perfect that the engineer could plan. **The contractor** gets a ditch which satisfies the engineer and land owner, at a cost to himself less than the same character and quality of ditch could be produced in any other way.

Notice the Austin Drainage Excavator Ditch shown by the accompanying engraving from an actual photograph—the ditch will remain just as perfect in shape for years.

N. B. Agents wanted in unoccupied territory.

Send for catalogue "S" describing complete line.

OUR FULL LINE COMPRISES

The Austin Tile Ditcher — The Austin Highway Ditcher — The Austin Drag Line Excavator
The Austin Levee Builder — The Austin Drainage Excavator — The Austin Rolling Platform Traction
The Austin Side Hill Ditcher — The Austin Orange Peel Ditcher — The Austin Stump Puller and Grubber

We Sell Outright or Lease

F. C. AUSTIN DRAINAGE EXCAVATOR CO., Railway Exchange Chicago, Ill.

Morris Machine Works

Baldwinsville, N. Y.

Centrifugal Pumping Machinery, designed for any irrigating proposition. Send details or specifications of what is wanted and we will recommend a pumping outfit to supply the need.

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THE IRRIGATION AGE COMPANY, Publishers, Chicago, Ill.

THE 17TH NATIONAL IRRIGATION CONGRESS
WILL BE HELD AT SPOKANE, WASH.,
AUG. 9-14, 1909.

The Advantages of Irrigation

There is scarcely an acre of ground under cultivation in North America that would not produce more and better crops if there were at hand an abundant water supply. Irrigation, properly carried out, means more homes and greater comfort, more profit from crops; schools in close proximity; villages on every hand; arid wastes converted into green fields; and such general prosperity as can hardly be dreamed of by those who are not familiar with the results of even the present infancy of irrigation in America.

It is calculated that in the near future, irrigation will reclaim 100,000,000 acres of desert lands in the United States alone, and this land will give support to an additional 50,000,000 population. Why not do *your* part and secure these advantages for yourself and your community?

The gasoline engine driven pump here illustrated was designed especially by us for truck garden and orange grove irrigation and for the general irrigating of small tracts. It is made in sizes from 4x4½ to 6x6, the latter size having a capacity of 50,000 gallons per day of 10 hours with an operating expense of approximately 45c per day.

Give us an idea of the duty the pump would have to perform, together with any local conditions, such as amount of rainfall, etc., and we will quote on a satisfactory pumping outfit. As we make a very complete line of power pumps for operation by any power we are positive that we can provide you with an efficient and economical irrigating outfit that will secure for you irrigating advantages far beyond what you expect. A few lines to us will bring full particulars.

THE DEMING COMPANY ❧ ❧ SALEM, OHIO

HAND AND POWER PUMPS FOR ALL USES

HENION & HUBBELL, CHICAGO, ILL., General Western Agents.
Other agencies in all principal cities.

The Temple Irrigation Equipments the most Economical and Certain Means of Lifting Water

55 YEARS' EXPERIENCE

Write us for Information and Prices—State Requirements

CENTRIFUGAL PUMP AND GASOLINE ENGINE IRRIGATION OUTFIT.

The Temple Water Elevators --The Temple Centrifugal Pumps

Manufacturers of all kinds of Hand and Windmill Pumps

Also Manufacturers Single Cylinder, Double Cylinder and Four Cylinder Gasoline or Kerosene Engines

Briefly stated the advantages of our Double Cylinder Engines are as follows:

First—They are more economical in the use of fuel. On light loads one cylinder can be used, reserving both cylinders for heavy loads.

Second—Although weighing about one-half the weight of a single cylinder engine of same rated capacity, vibrations are practically overcome, demonstrating conclusively that in proportion to strain the double cylinder "Master Workman" is the stronger engine.

Third—The heavier weight of a single cylinder engine is due to the fact that it must have heavier fly-wheels in the horizontal type, and a longer, higher and consequently much heavier base than is required for the "Master Workman." The heavier the fly-wheels the greater the strain on the crankshaft, so you will realize that neither heavier fly-wheels or a heavier base contribute one iota to the strength of a single cylinder engine.

Fourth—When vibrations are overcome, as in the "Master Workman," the lighter the engine and the less cumbersome it is, the greater its sphere of usefulness and the cheaper and more convenient it can be handled.

Fifth—Lubrication in our engine is absolutely perfect. There is no forced lubrication, lubrication being by gravity. Certainty of lubrication is of vital importance in the steady running and operation of a gasoline engine.

Sixth—All mechanism is in full view, which will enable you to thoroughly understand the operation of a gasoline engine. The worst kind of complexity is concealed mechanism.

THE TEMPLE PUMP CO. Factory, 15th St. and 15th Place, near Canal St. Chicago, Ill., U. S. A.

SUPERIOR

THE NAME TELLS A TRUE STORY

SUPERIOR DRILLS are Used and Appreciated by Good Farmers the World Over

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GENERAL AGENTS FOR WESTERN TERRITORY:

Dean & Co., - - - Minneapolis, Minn.
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Eastern Farmers please write direct to the Manufacturers

AMERICAN SEEDING MACHINE CO., (Inc.)
Springfield, Ohio

GRAIN DRILLS

New American Turbines

will improve your water power because they are EFFICIENT, POWERFUL and DURABLE.

Our line of

HEAD GATES and HOISTS

is the most complete on the market, and we have patterns for all sizes and types. Don't forget that a reliable Head Gate is one of the important parts of any power plant.

Send for Catalogue 25.

The Dayton Globe Iron Works Co.

Dayton Ohio

The Greatest Dairying Proposition

Land of the Tall Grass, the Big Red Clover and the Home of the Cow

We offer better opportunities for the farmer of small means to get into successful dairying than is offered in any other part of the United States.

With a cash capital of $1,000 any industrious farmer can become well-to-do in eight years on our Dairy Farm Land in Beltrami and Clearwater Counties, Minnesota.

Read What Experts Say of Our Land

"Destined to be the Greatest Dairy Country in the World."—W. M. HAYS, Asst. Secretary of Agriculture, Washington, D. C.

"The Almighty has set it apart for a Dairy Country."—Ex-Gov. HOARD, Editor Hoard's Dairyman.

"There is no section of our State or Country that is better suited for dairying and the raising of diversified crops than the Northern part of Minnesota."—C. P. BULL, Professor of Agronomy, University of Minnesota.

"The Agricultural capabilities of this area (Northern Minnesota) is away beyond the popular estimate * * * The ability of the soil to produce good crops need not be questioned."—THOS. SHAW, N. W. Editor Orange Judd Farmer, and formerly Professor of Agriculture, University of Minnesota.

"In no other portion of the United States can Dairying be so profitably carried on."—R. A. MOORE, Professor of Agronomy, University of Wisconsin.

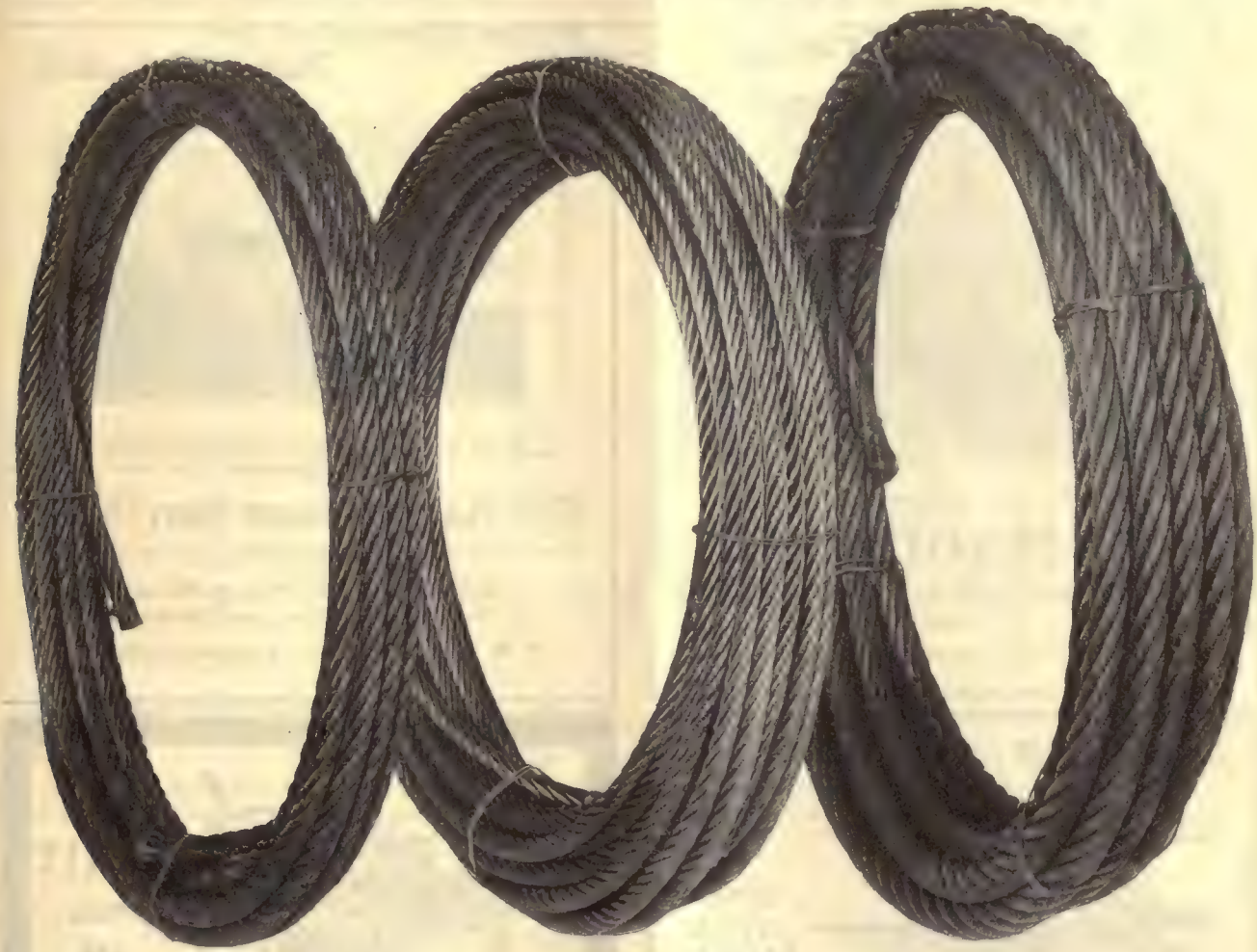
Write Us for Prices of Land and Further Particulars

The Northern Minnesota Dairy-Farm Land Co.

Tenney Block, Madison, Wis.

Sold direct or through our distributers.

Large stocks carried at convenient points all over the country, ready for quick delivery in either short or long lengths, on reels or in coils.



72 Feet
¾-in. Crucible Cast Steel
Hoisting Rope

202 Feet
¾-in. Monitor Dredge
Rope, 6 x 19

78 Feet
1-in. Plow Steel
Hoisting

American Dredge Rope

IN the great work of reclamation of the submerged lands of the Mississippi Valley there is no more active mechanical factor than our dredge rope. We make this rope with full knowledge gained from years of experience in the hard usage to which it is subjected, than which perhaps no other service can show an equal. There is not the same risk of life that goes with the operation of an elevator or a mine hoist, but there is greater wear, necessitating a very close study of the requisite quality of material and also experience in manufacture, to produce a flexible, reliable and durable dredge rope.

We offer our rope to dredgemen with assurance of the highest ***uniform*** quality and efficiency, as proven by the many years that it has now been successfully identified with this service.

American Steel & Wire Co.

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Galvanized Steel Irrigation Flumes and Water Troughs

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—OR—

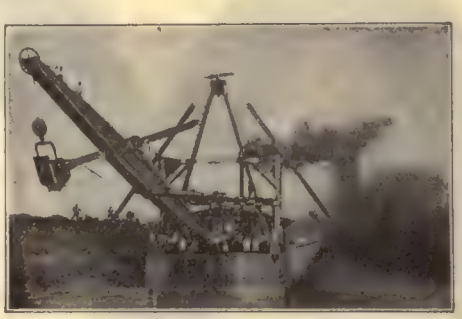
T. C. EGLESTON, 714 Ideal Bldg., Denver, Colo.

Ditching Dredges, Placer Mining and Traction Dredges

SUITABLE FOR ALL CLASSES OF WORK

Steam Shovels—All sizes

Ballast Unloaders



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MARION, OHIO

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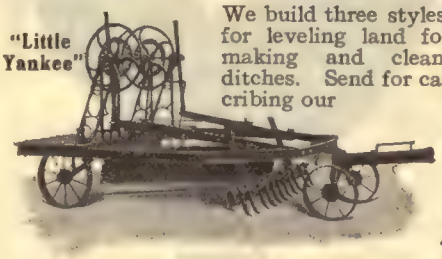
IRRIGATION LEVELERS and DITCHERS



We build three styles of Graders for leveling land for irrigation, making and cleaning lateral ditches. Send for catalogue describing our

"OHIO," "LITTLE YANKEE" and "SHUART"

Address

The Ohio Road Machinery Company
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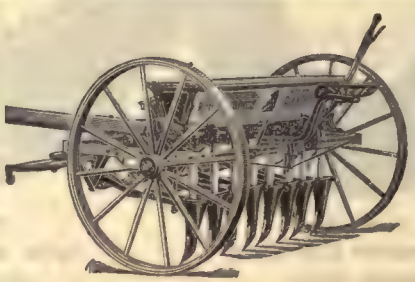

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Plain and Fertilizer

HOOSIER HOE DRILLS HAVE BEEN STANDARD FOR MORE THAN 50 YEARS

Made by

THE AMERICAN SEEDING MACHINE CO.

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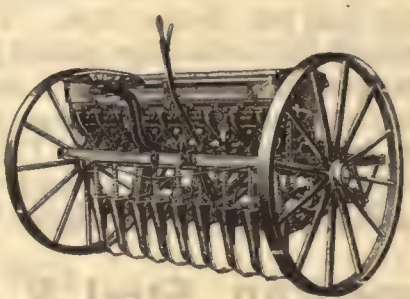


Supplied in all Styles and Sizes.

Grass Seed Attachments May Be Added.

The Chas. T. Manning Realty Co., Ltd.

SOLE SALES AGENTS

The Gooding Townsite Company, Ltd.

RESIDENCE LOTS.
BUSINESS LOCATIONS.

Improved—Irrigated Lands—Unimproved.

GOODING, IDAHO.

Send $2.50 for The Irrigation Age 1 year, and The Primer of Irrigation

THE IRRIGATION AGE

VOL. XXIV CHICAGO, JUNE, 1909. NO. 8

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION — THE DRAINAGE JOURNAL
THE IRRIGATION ERA — MID-WEST
ARID AMERICA — THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,
112 Dearborn Street, - - CHICAGO

Entered as second-class matter October 3, 1897, at the Postoffice at Chicago, Ill., under Act of March 3, 1879.

D. H. ANDERSON, Editor

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, $2.00. If ordered in connection with subscription, the price is $1.50.

SUBSCRIPTION PRICE.

To United States Subscribers, Postage Paid, ... $1.00
To Canada and Mexico, ... 1.50
All Other Foreign Countries, ... 1.50

In forwarding remittances please do not send checks on local banks. Send either postoffice or express money order or Chicago or New York draft.

Official organ Federation of Tree Growing Clubs of America. D. H. Anderson, Secretary.

Official organ of the American Irrigation Federation. Office of the Secretary, 212 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 24 years old and is the pioneer publication of its class in the world.

Success Greets Congress Plans.

Spokane is enthused, elated, exultant. Two months before the day when the National Irrigation Congress will open its sessions in that city success is assured. Western spirit, backed by western brain and vigor, has awakened the nation from its apathy and turned its eye to the west and its thought to progress. August 9-14 will be potent in the history of American development and industry.

Railway builders, financiers, statesmen, scientists, officials—and more, the eastern farmer and truck gardener—have agreed to make their home in Spokane for several days and discover for themselves whether the reports of bumper fruit and grain crops from western irrigated land are chimerical or real. Interest has been aroused, and with its usual incisive inquiry American labor and American capital will investigate.

Nor is Spokane too strongly intoxicated by the first draughts of success. Under the able direction of the Board of Control for this congress new plans for entertainment and comfort of the visitors are being formed, while the detail of the old are assuming permanent form. For years the west has beckoned the east, has urged it to leave its crowded cities and villages for the free, wholesome, remunerative life of the mountain and the valley. At last the call is heard and the west is to be the host.

Spokane is a fitting city for the welcome. Realizing its responsibilities and its duties to its fellows, plans for the great gathering have been drawn on comprehensive lines. Aggression and energy have triumphed and the irrigation age is dawning.

State Anthem.

Reginald De Koven, composer of "Robin Hood" and other light operas, and Professor Edmond S. Meany, head of the department of history in the University of Washington, were signally honored by both houses of the state legislature in regular session at Olympia, when, by joint resolution, "Washington Beloved" was declared the state anthem. Mr. De Koven's music for Professor Meany's verses is dignified and distinctive. The words follow:

"Washington Beloved."

Thy name, oh Washington renown'd,
We hail from far and near,
Thy glories joyfully resound
In songs of praise and mighty cheer.

Thy fame, oh Washington serene,
Leads up on to the sky,
While we thro' ev'ry changing scene,
Thy purple pennants lift on high.

Thy deeds, oh Washington benign,
Will last as hills of stone,
While we like ore the fires refine,
Will ring forth praise to thee alone.

Thy sons, oh Washington belov'd,
Lift up their heads in pride,
By whatsoever sea remov'd
To thee, in love, their lives are tied.

Delegates Appointed.

Governor Deneen of Illinois has appointed a list of delegates from this state to the Seventeenth National Irrigation Congress, which is to be held at Spokane, Washington, August 9 to 14 of this year. It is the hope of those interested in the matter that all of the delegates appointed may be able to attend, as it will give them an opportunity of studying conditions throughout the western country and gaining knowledge of the development under irrigation not otherwise obtainable.

We are informed that Mayor Busse of the City of Chicago has also appointed a list of delegates, and, with those appointed by the various commercial bodies of the State of Illinois and mayors of other cities, it is to be expected that a very large attendance will be registered from this state.

Conspire Against Lying Land Agents.

From the valley of the Sacramento comes a weird report, calculated in its innuendo and its intimations to fright the public into a close grasp upon its purse string when the seductive land agent presents his printed encomium on the fruitfulness and beauty of the valley as an abiding place for the genus homo.

Libels have gone forth. Either the land vender dealing in Sacramento valley tracts has seen double when he viewed the crops or he has maliciously misrepresented the beauties and favors to be found in this land of promises. And forthwith must he subside.

In council assembled the Sacramento Valley Development Association has declared that there has been deception, fraud and truth-destroying methods used in the sale of Sacramento lands, and that, moreover, the victims, carrying away the wrathful thoughts of the gold-brick purchaser, are active and pernicious in discouraging their friends from wandering toward the shores of the Sacramento.

The association proposes, through its own investigations and researches, to effect a cure by giving approval to those land agents who conduct their business along honest, legitimate lines. Furthermore, it proposes to ostracise and condemn the bad, untruthful, unprincipled fellows who cause the trouble.

More consummate boy-play from a body of intelligent American citizens cannot be imagined. The plan smacks strongly of favoritism. As yet the national and state governments retain the prerogative in deciding as to the legitimacy of a citizen's business or social acts.

The action of the Sacramento Valley Association may spring from commendable motives, but the method by which they hope to reach the end reflects no credit upon the mentality or astuteness of its members.

Peculiar Advertising Methods.

Mr. Gifford Pinchot has made the statement through his advertising press bureau that President Taft is heartily in sympathy with his policy, and he says in so many words that he will have as free a hand under this administration as was granted him under the Roosevelt regime.

This, it seems, is rather premature on the part of Mr. Pinchot. We believe that if President Taft fully understands this gentleman's method of advertising his forestry affairs he will call a halt. It may not be generally known that the Forestry Bureau contracted with and paid money to an editorial exploitation bureau, who saw to it that all of its matter was published in the daily press throughout the country, either as paid stuff or inserted by careless and thoughtless editors without pay.

This bureau was instructed to see that this matter was placed in various publications throughout the country, particularly the daily papers, and to pay for the space where necessary or to push it through on a free base if possible. The individuals conducting this bureau are high-minded and honorable gentlemen who are in good standing in the newspaper world, and matter which they send out is frequently accepted by publishers of the middle or smaller class dailies without question. The larger dailies, however, are acquainted with the plan and must be paid something for the space occupied. The matter sent out by this bureau is usually high grade, and were it not for the fact that conditions connected with the Forestry Bureau and its work put out through this medium are not clear, and that there is a sort of a secrecy maintained concerning the work, it would, perhaps, not be worth while calling attention to it. We would suggest, however, that the small country publisher who receives matter of this kind should demand pay for the space occupied, the same a the publishers of the larger dailies.

One feature about this class of exploitation or publicity is that Mr. Pinchot and the Forestry Bureau are apparently in the background and are not known as in any way connected with the distribution of matter concerning their work, this press or publicity bureau being an institution distinct from any bureau supported by funds from the Federal chest. It is barely possible that Mr. Pinchot is paying this money from his private funds.

When the press of the United States is made acquainted generally with the fact that almost all of this matter which has been sent out concerning conservation and forestry has emanated directly from the office of Gifford Pinchot it is our impression that the publishers of the country will not be so keen to clip it out of proof sheets and "swallow it whole." Taken all in all, Gifford Pinchot is one of the best advertisers of himself

and his works in the United States. He has Lydia Pinkham beaten to a shade, in view of the fact that the majority of his advertising is secured without expense.

Awakens East to Irrigation Projects.

In placing before the industrial world an edition so replete in illustrations and news matter that new interest in irrigation works and progress has been awakened, the IRRIGATION AGE believes that it has well served its many stanch friends and supporters who are now financially or scientifically connected with the great projects of the west and south.

Aside from its normal circulation, the mammoth Irrigation Congress number reached financial and industrial institutions that had heretofore shown little interest in the reclamation of arid western lands. That this issue served as an educator to a great mass of new readers is proven by the receipt of a great volume of correspondence in the publication office since May 10.

While many of these communications are personal in their nature and of untold gratification to the publisher because of the expression of good will and congratulation upon the attractiveness of the special number, the great mass have contained requests for information about the coming congress, Spokane's transportation and hotel accommodations and the various other data desired by persons who contemplate attendance at this gathering.

From the fact that copies of this edition were mailed to libraries and other institutions where the public meets for recreation or study it is natural to believe that effects from the publisher's effort must be both far-reaching and beneficial to all projects and localities from which news matter had been gathered.

An unprecedented and unexpected demand for copies of this edition has already largely depleted the stock on hand for special orders. A glance at the record shows that of all special orders thus far received more than 50 per cent were sent by residents east of the Mississippi river, and unknown to have heretofore been interested in irrigation or reclamation.

Impersonally we quote the following words of kindness and encouragement:

"The issue is certainly a very live wire, and cannot help but result in a wonderful lot of good. I am sure it will benefit those parts of the country you were kind enough to exploit. I beg to thank you most sincerely for the fine mention you made of this company and our part of the country in your fine special issue."

W. D. Vincent, cashier of the Old National Bank, at Spokane, writes as follows:

"I am in receipt of the May number of the IRRIGATION AGE, and beg to thank you very much for your thoughtfulness and to assure you of my appreciation. The illustrations of the Spokane country are splendid, and the number will be of great benefit to everyone interested in irrigation, especially those interested in the Irrigation Congress."

Secretary Arthur Hooker, of the Spokane Board of Control, writes:

"This will acknowledge receipt of the copies of the May IRRIGATION AGE, forwarded to Mr. Insinger and myself. This edition of the IRRIGATION AGE is certainly of great value to those interested in irrigation and the Irrigation Congress. We would be glad to know how we can assist you in the future."

F. A. Hornbeck, land commissioner at Kansas City, says:

"Wish to congratulate you on your last issue, which is very attractive. Will you kindly inform me how I can get the names of the different irrigation projects in the arid west, not only the government but private enterprises that are irrigating say 10,000 acres or more."

E. F. Bohm, of Cleveland, expresses himself as follows:

"After laying down the May issue of the AGE I feel under obligation to express to you my unqualified admiration of this publication. It is not fulsome flattery to say that the IRRIGATION AGE is always "good" indeed, but the Irrigation Congress number stands head and shoulders above anything in its line that so far has come to my notice. Never before have I seen the situation as applying to Federal and Carey act projects so clearly set forth.

"As an admirer of both Mr. Harriman and Mr. Hill, I wish to thank you for your remarks, stemming the tide of ill nature and generally ignorant criticism of these two giants. What possible motive can a magazine have for indulging in such gallery plays as the present attack upon James J. Hill and his well-managed and lightly capitalized properties."

Scott Talks Irrigation.

"Nowhere in the world is agriculture so intelligent as in the irrigated regions; nowhere is it so productive, and nowhere else have the problems of poverty, isolation and failure been so effectually attacked."

Harvey W. Scott, dean of journalism in the Pacific slope, who has been identified with most of the uplift movements in the Northwest since territorial days, says this in a leading editorial in the Portland Oregonian, commenting upon the importance to the nation of the National Irrigation Congress to be held at Spokane, Aug. 9-14, 1909:

"If the people were interested in events in proportion to their importance the irrigation congress next August would plunge the whole country into wild excitement. One imagines, however, that our national equaniminity will not be greatly perturbed by it.

"Although the subject to be discussed relates vitally to human happiness, although the way we finally answer the questions which the eminent speakers at the congress will raise may decide whether 500 years from now the United States shall be a flourishing empire or a desert solitude, nevertheless it will not be easy to arouse more than a perfunctionary public interest.

"The great names of the orators, the pomp of civic festivity, the display of governmental science will all be needed to hold the languid ear of the indifferent farmer, whom nothing short of an earthquake will compel to think or study. Irrigation would rain gold into his tubs if he would set them out, but he won't until he is harried and hounded into doing it.

"But the farmer is no worse than other men. Few of us take more than a feeble and spasmodic interest in the things that concern us most deeply. Consider how speedily an audience vanishes whenever a speaker touches on education, a subject whose import is even weightier than irrigation.

"It is only by fits and starts that we can be induced to think of the salvation of our immortal souls. Some sporadic 'Billy' Sunday can turn our attention to these precious entities once in a while, but how long does it stay fixed? Salome dancing a frivolous hornpipe makes us forget time and eternity.

"If man were a truly rational being the minute he learned that irrigation would double the produce of his farm, even in such a favored region as the Willamette valley, he would rush to build dams and dig ditches, but he doesn't. He waits until somebody has pushed and prodded him.

"Think how long it has taken some of the rural brethren to begin spraying their apple trees. They know that a few doses of lead arsenate would save their fruit from ruin and line their pockets with dollars, but not a drop did they spray until a paternal government stepped in and gave them no choice. As a race we are just as lazy and short-sighted as we dare be, and most of us would far prefer to swing a heavy sledge hammer 10 hours rather than think 10 minutes.

"Such congresses as the one which will meet in Spokane next August are more valuable for reiterating old truths than for revealing new ones. Iteration is all that saves the world from a relapse into barbaric squalor. Hearing the truth about irrigation or anything else once only does us not the slightest good. We must hear it a thousand times and in every possible key.

"The Massachusetts savings bank insurance scheme was based on the supposition that when life insurance was made cheap and easy every person who needed it would step up and buy it. No madder dream was ever dreamed. The project has been open many months, but only two banks are offering insurance, and there is nobody to buy. To persuade us to insure our lives and save our wives and children from destitution we need a brazen-tongued agent to ring an alarm in our ears.

"Mankind is like the starving pauper who was on his way to the graveyard to be buried alive for his indolence. The merciful judge offered to suspend sentence if anybody would feed the condemned. A kindly farmer offered a meal of corn. 'Is it shelled?' inquired the pauper, with languid interest. No, it was not. 'Drive on, then,' said the pauper. We need such gatherings as the National Irrigation Congress to shell our corn for us.

"Civilization originated in countries where men were forced to irrigate the land or perish. In Babylonia and Egypt were laid the foundations of every science and all the arts. The reason is plain enough. Irrigation drives man to think and plan on the one hand and to co-operate with his neighbors on the other. The habit of thinking about one subject leads him to exercise his brain on others, and presently he discovers the great truth that ideas are upon the whole beneficial to him rather than baneful.

"Co-operation is the only way out of most rural difficulties, and it is easier in irrigated regions than elsewhere for divers reasons. One is that irrigation depends from the beginning on co-operation. But also the farms are necessarily small, people live near together, contiguity develops confidence, the plane of public intelligence rises, the communal consciousness sets to work and presently the whole neighborhood studies, buys, sells and thrives as one man."

Credit To Whom Credit Is Due.

In this day of the reckless, illogical publicity agent, with his "scheme" for free advertising and his puerile, almost asinine methods for accomplishing the object, it is a genuine pleasure to meet up with a man whose mental horizon is broad enough to permit the discard of disreputable and the adoption of the legitimate, common-sense in his publicity work.

For consistent, persistent effort, a comprehensive view of existing conditions, and for aggressive, logical plans for the exploitation of the city and its resources, August Wolf, in charge of the publicity department for the Spokane Chamber of Commerce, merits high commendation.

Unswerving in his loyalty to Spokane and her interests, Mr. Wolf has gained the confidence of the press, that most powerful factor in all exploitation and advertisement. Through his capable handling of this department, the energy and enterprise of its citizens, and the growth of Spokane as the commercial center of the inland empire, are fast becoming familiar to and appreciated by the eastern peoples. The value of this publicity work to the city of Spokane, and indirectly to the entire west, cannot be overestimated.

AGRICULTURAL EXPERIMENT STATIONS and WHAT THEY DO.

Few people have any conception of the vast amount of care and untiring perseverance that is exercised by the scientific investigators of our various Agricultural Experiment Stations. Years are expended by the professors and their assistants in the solving of baffling problems of an agricultural and horticultural nature. Millions of dollars in fruit values have been saved to the owners of farms and orchards by discoveries relating to the control of plant diseases. To an outsider the results obtained appear truly wonderful, yet they are gained by the possession of the same requisites that any success requires, viz., perseverance, care and initiative.

Fourteen years ago, when the Ohio Experiment Station first moved to Wooster, they intentionally selected land of little nutritive value, lacking nearly all the requisites most conducive to plant growth, and practically the worst ground in that part of Ohio. Today, after ceaseless experiments, with the action of fertilizers in various rotations and combinations, and by the application of past discoveries, their 400 acre farm contains the best ground under cultivation in Ohio, and it is getting better every year.

The bulletins issued by these varions Stations are valuable to any one engaged in farming, fruit-growing, dairying, etc., because they are backed by *facts*—the result of exhaustive experiments and conclusive tests.

Our farmers and fruit growers do not fully appreciate what the Government is doing for them in the maintenance of Experiment Stations. It seems to be difficult for them to fully accept the idea that these bulletins contain *real* and valuable information that they themselves would be unable to obtain, no matter how long they kept at it—because they would not understand how to go about it.

In order to better carry out his experiments in orchard spraying, the entomologist of a station will sometimes take entire charge of orchards in various parts of the state, owned by private individuals, and will make various careful experiments, using, of course, as a basis, the hard facts previous experience has given him. The owner, of course, gets the benefits of the fruit grown in the course of the experiments, which sometimes cover a space of three and four years.

For instance: A small apple orchard of 12 acres, owned by John A. Stokes, Sandusky County, Ohio, which consisted of four acres of trees 24 years old, 4 acres 20 years old and 4 acres 12 years old, containing 534 trees in all, and there had been very little care given to these trees until last year, when the Entomologist of the Ohio Experiment Station took charge of them. The trees were large size in the main, the varieties consisting principally of Baldwin and Ben Davis, although Stark, Winesap, Grimes Golden, King, Pippins and Fameuse were also grown.

Before the orchards were in bloom the majority of the older trees were banded. That is, a band of sticky material was placed around the trunks a few feet from the ground, so that when the female Canker Worm attempted to climb the tree and deposit her eggs in the bark, the band would obstruct her and hold her until she could be removed from the tree. Then other bands would be placed higher up the trunk, so that it was impossible for the insect to pass them all. In this manner it was estimated that fully 20,000 female canker worms were taken *from one tree* at the beginning of the season. Then, as soon as the blossoms had fallen, the entire orchard was given a heavy spraying with arsenate of lead, combined with Bordeaux mixture.

The spraying outfit consisted of a 1½ H. P. water cooled gasoline engine power outfit. The youngest orchard was sprayed first, the oldest next and the orchard 20 years old was left until the last. A pressure of 100 to 125 pounds was maintained by the sprayer. Where arsenate of lead was used alone for the first spraying, a second spraying with Bordeaux or lime-sulphur, or with Bordeaux and arsenate of lead combined, was given as soon as possible after the first application. In the first spraying about 20 gallons of spray mixture were used per tree for the largest trees and ten to fifteen gallons for the smallest, or 12-year-old trees. Some trees received a third spraying with arsenate of lead alone about the 20th of July.

At harvest time an unsprayed plot yielded 42.5 per cent wormy apples, while the sprayed trees yielded about three or four per cent wormy apples. From this orchard there were gathered 1,650 barrels of fruit, which sold at prices ranging from $3.00 to $5.00 per barrel. A carload of drops, weighing 21,600 pounds, was sold in bulk at 65 cents per 100 pounds. From 200 to 300 bushels were sold locally as summer apples at nearby towns and to neighbors. The total income from the orchard was approximately $7,400.00. It is safe to say that from $5,500 to $6,000 of this was net profit, and that the average net return per acre was between $400 and $500. Think of it—$500 per acre for growing apples!

Administration Building, Ohio Agricultural Experiment Station, Wooster, Ohio.

From the above we can draw several conclusions; viz., that a power sprayer is necessary to thoroughly drench all portions of the tree and to drive the spray down into the buds and embryo apples, because of the uniform higher pressure than a hand sprayer; secondly, that a knowledge of exactly *when* to apply the mixture is most essential, and thirdly, a knowledge of what proportions of the poison to use is necessary. From these conclusions we can draw another—that experiment stations have practically solved the problem of successful spraying and fruit growing, and that a careful co-operation with them will insure every fruit grower who is willing to take the trouble a profit on fruit and other crops that is far beyond his most sanguine expectations.

Due credit must be given the Ohio Agricultural Experiment Station Entomological Department (Prof. H. A. Gossard in charge), to whom the writer is indebted for data and special information regarding the spraying of the orchard in Sandusky County.

Success Smiles On Irrigation Congress.

Governors Appoint Delegates—Avalanche of Inquiry Reaches Officials—Industry's Giants Will Attend.

In daily receipt of hundreds of letters from citizens all over the United States, asking for information as to transportation facilities and hotel accommodations, Chairman Insinger and Secretary Hooker, of the Spokane Board of Control, are elated at the prospect of a mammoth attendance and country-wide interest in the National Irrigation Congress to be held at Spokane Aug. 9-14.

State officials are co-operating with the board to make the congress memorable in the annals of irrigation progress. Satisfied with the prospects for attendance, the board is now doubling its effort toward the proper entertainment of the many distinguished visitors. New features are rapidly being outlined and arranged.

Because of the peculiar significance of the congress, in view of rapidly mending financial conditions and the outlook for development of projects heretofore lying dormant for lack of funds, many of the most influential railroad officials and industrial chiefs have decided to arrange a trip to Spokane in August. It is apparent that the aggressive publicity methods employed by the Board of Control, and supplemented by the many agencies favorable to irrigation projects, have awakened the public to the importance of reclamation work. Two months in advance of the actual date of the congress it can be predicted with every degree of certainty that the seventeenth gathering will be the most important ever held by the organization.

Three states, each backed by organization and sentiment, will be actively in the field to capture the next national congress. Illinois, represented by members of the Chicago Association of Commerce, will be prepared to press the claim that this city should be the next meeting place. Pueblo believes it has prior claims and will send several trainloads of delegates and boosters to urge its selection for 1910. South Carolina will occupy a chair near the rostrum when the date for fixing the next congress arrives, and it is predicted that the southerners will be prepared to show cause why the next meeting should be held in the south.

WITH FLAGS AND MUSIC.

Spokane Plans Elaborate Welcome and Entertainment of Congress Visitors.

Various stages of the development of the Pacific Northwest, from the entrance of Captains Meriwether Lewis and William Clark into what was then the Oregon country in 1805 to the present day, will be exemplified by two parades of progress and a march in review by the industrial and irrigation army.

These open-air features are being arranged as follows:

August 10, Afternoon—Parade of progress, showing the transformation of the Northwest from semi-savagery to civilization, by a series of panoramic floats and mounted men and marchers.

August 11, Evening—Illuminated parade of progress representing various periods from 1805 to 1909.

August 12, Afternoon—Parade and countermarch of the industrial and irrigation army, with 10,000 uniformed men in line.

Ten massed exhibits of the resources of the country will be installed at street intersections in the prominent parts of the city to show visitors the progress of the Northwest. These pyramids will include grains, grasses, fruits, lumber and minerals.

Marching clubs from the irrigated and dry-farming districts in Idaho, Oregon, Montana, Washington, California, Wyoming, Utah, North and South Dakota, Colorado, Nevada, Arizona, Kansas, Texas, Oklahoma and other states in the middlewest, east and south and from the provinces of British Columbia, Alberta, Manitoba and Saskatchewan are expected to participate in the parades.

The feature of the opening of the congress will be the raising of hundreds of flags to the tops of as many 40-foot poles in the residential districts and the unfurling of flags and banners in the business sections the morning of August 9, when massed musicians, headed by the Third Regiment United States Infantry Band, will play patriotic airs. This will be followed with the rendition of the Irrigation Ode by a large chorus of trained singers and the singing of state hymns by school children.

GOVERNORS SELECT DELEGATES.

In response to the request of R. Insinger, chairman of the local board of control, governors of the various states have appointed official representatives to the congress. Among the lists of these state delegates, instructed to attend and participate in the deliberations, are the following:

Nebraska—D. Clem Deaver, Henry T. Clark and E. A. Cudahy, Omaha; W. S. Lorlan, McCook; Grant L. Shumway, Scotts Bluffs; A. M. Morrisey, Valentine; Charles Coffee, Chadron, James B. McDonald and J. G. Bealer, North Platte; Adna Dobson, Lincoln; C. A. Edwards, Kearney; H. O. Smith, Lexington; Page T. Francis, Crawford; M. B. Smith, Bridgeport, and W. A. Sharpnack, Alma.

Utah—Fred J. Kiesel, Ogden; John Henry Smith, T. C. Callister, Caleb Tanner and John Dern of Salt Lake City.

Texas—Ed. R. Kone, Commissioner of Agriculture, Austin; W. S. Chaplain, Mercedes; B. H. Collins, Anahuac; L. C. Hill, Harlington, and P. A. Hayes, Barstow.

South Carolina—E. J. Wilson, Commissioner of Agriculture, Commerce and Industries, Columbia; F. H. Hyatt, President of the Good Roads Association, Columbia; D. F. Moore, Brunson; J. A. Harvey, Pinopolis, and Samuel G. Stony, Charleston.

NOTES.

Professor Liberty Hyde Bailey, director of the horticultural college at Cornell University, who is widely known throughout the west as head of President Roosevelt's farm life commission, which made a tour of the country last fall, will accept a place on the program and participate in the discussions.

Ex-Governor Alva Adams, of Colorado, has been invited to give an address. Because of his wide knowledge of agricultural and irrigation affairs it is believed that his words will arouse much interest.

Governor Ansel, of South Carolina, has instructed his state's representative to secure all possible data relative to drainage and good roads, in which the state is now largely interested.

It is intimated that the famous Mexican band will be taken to the Spokane congress by the delegations from El Paso and other parts of Texas. Several coaches of Texans are expected to arrive at the opening date.

Mayor A. L. Fugard, of Pueblo, advises Chairman Insinger that a train load of irrigationists from Pueblo and vicinity will attend the congress, and that he will appoint several delegates to officially represent the district.

Senator J. P. Dolliver, chairman of the senate committee on forestry and agriculture, has declared his intention to spend several days at the congress unless detained in the east by unexpected work.

SETTLED CONTROVERSY.

A controversy between two boards of directors of the Umatilla Water Users' Association, Oregon, both claiming to have been legally elected last January, has just been decided by the Secretary of the Interior so far as may be necessary to govern action by the department.

Because of the fact that the government project must be carried on in co-operation with the Water Users' Association, and as the secretary of the association must certify that a water right applicant is a member of the association before his application can be accepted, it was necessary for the Secretary of the Interior to determine which of the two boards should be recognized by the land department of the government.

After carefully reviewing the facts involved and the decisions of the courts applicable to the case, the Secretary of the Interior has instructed the Reclamation Service and the General Land Office to recognize the so-called new board of directors, of which Mr. H. T. Irvin is president.

Looking East from Administration Building, Alaska-Yukon-Pacific Exposition.

Utah's delegation will be accompanied by a band, and will charter several trains for its transportation.

Gifford Pinchot, chief of the forestry service, who will be one of the speakers at the sessions, writes to Mr. Insinger that he will be at the congress from start to finish.

Thomas T. Crittenden, Jr., mayor of Kansas City, Mo., announces the following delegates to represent his city at the congress: Henry C. Brent, John P. Wagner, J. G. Forrest, Frank Lott, William Knepp and W. L. Shelton.

Idaho will send several large and representative delegations. The contingent from the southern part of the state is to be headed by Governor J. H. Brady.

Missoula and the Bitter Root Valley will send a delegation of 150 and a brass band to participate in the parades.

The offer of the board of control to refund the railroad fares to any community or district sending a band of 20 or more pieces was received with favor in numerous places, and will result in a number of bands accompanying the delegations.

Interest attaches to the prospective visit of the Nelson companies, 102nd Regiment, Rocky Mountain Rangers of British Columbia.

Only 1,739 feet of the Gunnison tunnel, Uncompahgre irrigation project, Colorado, remain to be excavated, an advance of 595 feet having been made during March. Work in the east portal was in treacherous ground, which had to be timbered. The heading is in decomposed granite. Nearly 40,000,000 gallons of water were pumped during the month. The west heading was in good ground. A new gravel pit was opened and 722 feet of concrete arch and sides were placed. The average flow of water in this heading was 48,226,000 gallons for each 24 hours. Other work on the project consisted in cleaning the old canals and repairing the south canal.

The Secretary of the Interior has allotted the sum of $100,000 for the construction of three sections of the Flathead irrigation projects, Montana, known as the Jocko, Mission and Polson units.

Contract has been awarded to J. E. Hilton of Vale, S. D., for the construction of main laterals, involving the excavation of approximately 23,500 cubic yards of material, and 25.1 miles of small lateral excavation, in connection with the Belle Fourche irrigation project. The contract amounts to $10,111.

Pathfinder Dam Is Finished.

Government Work Reclaims 400,000 Acres—Cost Was $1,200,000—Water Rights $45 Per Acre—Labor In Demand.

The Pathfinder Dam, one of the highest structures of its kind in the world, is completed. Resting on a bed of solid granite, and hewn from the vertical walls of the same formation, through which the North Platte River has cut its channel, the massive masonry monolith closes the chasm. It rises 215 feet above its foundations, and is 500 feet long on top. But the real significance of the event is that it marks the most important step in the reclamation of large tracts of the Great Plains area in Wyoming and Nebraska, and their transformation to thickly settled farming communities, with numerous populous and prosperous towns and villages.

The North Platte River drains an area of 90,000 square miles, carrying the run-off of a large mountainous territory. Fed by the melting snows of spring and early summer, its volume swells to large proportions, but in the late summer it shrinks to a small stream, distributed over a wide stretch of shifting sands. Every drop of the low water flow has long been appropriated, and the conservation of the flood waters of the river was beyond the reach of private capital. It was for the purpose of storing the flood and winter waters and controlling the flow of this irregular river that the great dam just completed was planned.

Behind the massive wall of masonry a million acre-feet of water will be stored each year, and the destructive floods of the North Platte River, which annually have caused damage far in excess of the cost of the dam, will never again visit the valley. The name of the structure is most appropriate, in that it makes of the dam a fitting monument to commemorate forever the achievements of the nation's daring pioneer and explorer, Captain John C. Fremont, "The Pathfinder."

The North Platte Irrigation Project is one of the largest so far undertaken by the Government. From the Pathfinder Dam at a point on the North Platte River about 50 miles southwest from Casper, Wyoming, to the farthest limits of the irrigable lands in Nebraska, the distance is 500 miles, and it is estimated that 400,000 acres of land in Wyoming and Nebraska, or more than double the total area of land cultivated in the entire state of Rhode Island, will be divided into small farms and irrigated.

The comparison afforded by the following table, showing the dimensions, cost and effectiveness of the Pathfinder and three large eastern dams, is most interesting. It is found that the Pathfinder dam, which cost only $1,200,000, has a storage capacity more than ten times that of the New Croton, which cost six times as much.

Dam—	Height in ft.	Length in. ft.	Contents in cu. yds.	Cost	Storage capacity in acre-feet.
Pathfinder	215	500	60,400	$1,200,000	1,025,000
Wachusett	228	971	273,000	2,226,000	192,000
New Croton	297	1,072	833,000	7,631,000	92,000
Ashokan	220	*4,800	a7,900,000	12,700,000	368,000

*Masonry 1,000 feet long and earthwork 3,800 feet.
a900,000 cubic yards of masonry and 7,000,000 of earth.

One hundred miles below the storage dam a low diversion dam has been thrown across the river, which turns the waters into the Interstate Canal, to supply lands in Wyoming and Nebraska. This canal when completed will be 150 miles long, but at present only 95 miles have been excavated. It has a capacity at the headgates of 1,400 second feet. Hundreds of miles of laterals have been constructed to distribute the water over the lands.

Under the terms of the Reclamation Act all of the land under this project which belongs to the public domain is open to entry under the homestead law in farms of about 80 acres. Each settler is required to pay his share of the cost of building and irrigation works. This amounts to $45 per acre, payable in ten annual installments without interest.

Among all the great irrigation works now under construction by the Government, none is richer in historical association than the North Platte project. It occupies more than 250 miles of the old Overland Trail, which was followed by the California gold seekers, and by the Mormons in their migration westward. The old highway is distinguishable in scores of places. With an average width of more than one hundred feet, it stretches on mile after mile, now overgrown and only distinguishable from the general surroundings by the difference in vegetation. Its great width is principally due to the fact that the Mormons traveled in great companies, their wagons often moving in a solid phalanx five or more abreast. Beside the trail at numerous points lonely headstones mark the graves of those who perished on that western journey. To those who have read "The Adventures of Captain Bonneville," "Astoria," the discoveries of Captain Fremont, histories of Mormon emigration and of the Forty-niners, such fiction as "The Virginian," and the adventures of Buffalo Bill, this valley will be familiar and full of interesting associations. But the greatest change in all the history of the valley has been brought about by the construction of the great irrigation system now well on its way to completion. Already the dreary monotony of plain and sky has been broken, and thousands of homes and fields of green dot the landscape.

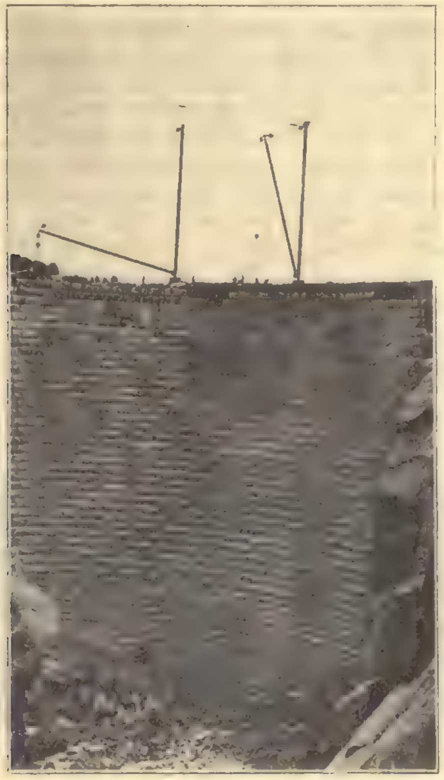
Lands which a few years ago were valued at from $1 to $5 per acre are increasing rapidly in value and now sell readily at from $20 to $50. Most of the land for which water is now available is in private ownership, but many of the farmers who have holdings in excess of that for which the Government will furnish a water right must dispose of part of their lands at reasonable prices.

A railroad extends the entire length of the project, and the numerous towns along this line have more than doubled in population since the initiation of the Government irrigation project. The influx of thousands of farmers to the valley has created a demand for all classes of labor.

That these opportunities are not being overlooked is evidenced by the hundreds of letters of inquiry which are being received by the Statistician of the Reclamation Service at Washington. To meet the demands of the homeseekers requiring information the Reclamation Service has also established offices at Denver, Colorado, and at Chicago, Ill.

Reclamation Service News

The Williston irrigation project is now 63 per cent completed. An equalizing reservoir adjacent to the power house has been filled by means of the pumping barge, and an addition to the power house is being built to accommodate an additional 500 K. W. steam turbine and generator. The high tension line from power house to pumping barge is being changed to low tension to eliminate the transformers now located near the barge, which will be installed at the power house and used in transmission of power to Buford-Trenton project during the irrigation season of 1909.



Pathfinder Dam Nearing Completion.

Irrigation under the Carlsbad project, New Mexico, was commenced March 15th, and water will not be turned out of the canal again during the season. There are about 2,000 acres in winter wheat under the project. Many acres are being planted in alfalfa and orchards are being set out. Applications have been made for water for 14,000 acres up to the present time.

Under the Leasburg unit of the Rio Grande project more than 16,000 acres are now in cultivation. The heavy snows in the mountains of Colorado indicate that the water supply will be plentiful during this crop season.

On the 15th of March a third shift was put to work on the Strawberry tunnel, Strawberry Valley irrigation project, Utah. The total progress during the month was 320 feet. The material in the tunnel is variable, changing from medium grained sandstone to medium lime containing streaks of clay and carrying considerable water. On the 25th the flow of water was 70 gallons per minute, but this quantity has gradually diminished. The changeable weather, made the road to the tunnel almost impassable. The power canal and both power houses were operated during the past month practically without intersuption.

Segregation and Release

Official reports show that the following named land has been withdrawn from any form of disposition whatever, under the public land laws: 10,240 acres lying in townships 20 and 21 S., R. 28 E., Willamette Principal Meridian, for the Emigrant Creek Reservoir in connection with the Harney project, Oregon; under the Dechutes project, Oregon, Willamette, Principal Meridian; 16,640 acres in T. 24 S., R. 6 E., for Crescent Lake Reservoir; T. 23 S., R. 6 E., all of unsurveyed township, for Odell Lake Reservoir; 23,040 acres in T. 25 S., Rs. 6 and 7 E., for Big Marsh Reservoir.

It is announced that the Secretary of the Interior has withdrawn from any form of disposition whatever, under the public land laws, the following described lands in connection with the Simcoe unit of the Wapato irrigation project, Washington: T. 10 N., R. 16 E., Secs. 3, 4, N. E. ¼ Sec. 5, all Secs. 9 to 16 inclusive, E. ½ Sec. 21, all Secs. 22 to 27 inclusive, Sec. 34, N. ½ and S. W. ¼ Sec. 35; T. 11 N., R. 16 E., E. ½ Sec. 12, all Sec. 13, S. E. ¼ Sec. 21, S. ½ Sec. 22, S. ½ Sec. 23, all Secs. 24 to 28 inclusive, E. ½ Sec. 29, E. ½ Sec. 32, all Secs. 33, 34 and 35; T. 10 N., R. 17 E., all Secs. 18, 19, 20, 29 and 30; T. 11 N., R. 17 E., all Sec. 5, S. E. ¼ Sec. 6, Secs. 7 and 18.

About 200,000 acres of land in the proposed Malheur irrigation project, Oregon, have been temporarily withdrawn from entry except under the Homestead Law. These lie in Townships 15 to 19 South, Ranges 43 to 47 East, Willamette Principal Meridian, and are believed to be susceptible of irrigation. Approximately 100,000 acres have also been withdrawn from any form of disposition whatever for use in connection with the following reservoirs under this project: Beulah, Warm Springs, Juntura, Upper Willow, Lower Willow, Upper Bully Creek, Lower Bully Creek and Harper reservoirs.

The following described lands, although not required for reservoir purposes for the Rio Grande project, will be irrigated thereunder, and were released from withdrawal and reserved under the terms of the Reclamation Act from all disposition except homestead entry: New Mexico. New Mexico Principal Meridian. (International Reservoir Site)—Township 26 S., R. 2 E., all Secs. 1, 2 and 11; N. ½, N. ½, S. W ¼, N. W. ¼ S. E. ¼ and lots 1, 2, 3 and 4 of Sec. 12; township 26 S., R. 3 E., W ½ N. W. ¼, W ½ S. W. ¼, Sec. 5; all Sec. 6; N. ½ N. E. ¼, N. E. ¼ N. W. ¼ and lots 1, 2, 3, 4, 5, 6, Sec. 7; lot 3, Sec. 8; township 29 S., R. 3 E., lots 1, 2 and 3, N. W. ¼ N. W. ¼, S. ½ N. W. ¼ and S. ½ Sec. 2; lots 1, 2, 3 and 4, S. ½ S. W. ¼ and S. W. ¼ S. E. ¼ Sec. 1; all fractional Sec. 12; township 29 S., R. 4 E., all fractional Secs. 16, 17 and 18.

About 130,000 acres of land which were withdrawn from any form of disposition whatever under the public lands laws, in connection with the Salt River irrigation project, Arizona, have been restored to the public domain and will be subject to settlement on and after June 3, 1909, but shall not be subject to entry, filing or selection until July 3, 1909. No person will be permitted to gain or exercise any right whatever under any settlement or occupation begun after February 26, 1909, and prior to June 3, 1909, all such settlement or occupation being forbidden. These lands lie in townships 1, 2 and 3 N., Ranges 1 and 2 W., Gila and Salt River Meridian.

In addition to the area thus restored about 184,000 acres which were withdrawn under the same project from any form of disposition except homestead entry, have been restored subject to settlement and entry on the same dates. Settlement and occupation of this tract between January 28, 1909, and June 3, 1909, are forbidden. These lands lie in Townships 4 to 7 N., Ranges 1 to 3 E., Gila and Salt River Meridian.

Approximately 52,000 acres of land which were withdrawn from all but homestead entry in connection with the Milk River irrigation project, Montana, have been restored to the public domain and will become subject to settlement and entry on such dates and after such notice by publication as the Secretary of the Interior may prescribe. The lands lie in Townships 30 and 31, Ranges 2 to 50, W., Montana Principal Meridian.

Baker City Project.

By William Fidelas.

Canal Construction Substantial—Long Tunnel Through Rock—Company's Acreage Known as Sunnyslope—Apples, Berries and Alfalfa Thrive—Direct Irrigation Brings Gratifying Crops—Fertile Soil and Magnificent Scenery.

East of and adjoining the limits of Baker City there is now being developed a tract of bench land destined to become one of the most valuable on the western slope.

During the winter of 1905-06 work was commenced by the Baker Irrigation company on an expensive canal to be used in irrigating the bench lands east of the city. The elevation of this bench land above the river required the building of a high-line canal of which the main canal, which carries the water from the river to the reservoir, is twelve miles in length and cost over $75,000 to construct.

Among the obstacles encountered in the building of this canal was the large amount of solid rock work necessary to dig through. Of course the first cost of this canal could have been reduced considerably by constructing wooden flumes across rocky points, but the company considered that a permanent canal, no matter what the first cost might be, the cheaper in the end. It was also found necessary to construct a large inverted siphon, in order to cross a deep gorge about 95 feet deep. At another point in the city limits of Baker City it was necessary to bore a 600-foot tunnel through solid rock in order to carry the water through a hill. At this point the canal is just 118 feet above the city.

A. L. Kinsley's Apiary near Bishop, Calif.

At the end of this twelve-mile canal a large reservoir is under construction. The area of the lake will be 240 acres, and will average over 25 feet in depth. It is about one and one-half miles from the city and will provide a pleasure resort where boating can be enjoyed. The aggregate length of main canals completed up to date is 28 miles, with a probable extension of about ten miles.

This system is sufficiently large to irrigate 10,000 acres, 3,500 of which are owned by the Baker Irrigation Company. The district is widely known as the Sunnyslope Suburban Farm Tracts, which are now being sold off in 5, 10, 20 and 40 acre tracts. Instead of spending large sums of money in advertising the land the company has adopted the slower but much more satisfactory method to settlers of depending largely on the publicity given by the purchasers. By this method the purchaser does not have to pay the additional costs of advertising.

A large part of this land has been farmed by the company for the last two years, by depending on direct irrigation, as the reservoir will be used for the first time during the summer of 1909. Fair crops have been grown heretofore, but with the late storage water heavy yields will be recorded this year. The larger part of this land will be planted out to apple orchards and alfalfa. It is expected that the larger incomes will come from apples, berries and vegetables. One onion patch is paying at the rate of $600 per acre, while potatoes and other vegetables have paid from $25 to $150 per acre.

The soil is of unusual fertility and produces wonderfully, it being of a volcanic ash nature, with sufficient sand to make it irrigate nicely. The depth varies from 30 to 70 feet. It is safe to say that no other irrigation project in the west has made the rapid strides in development for its size. Eighteen months ago there was nothing but sage brush on the land which is now on the market. Already there are several families living on small tracts which they have purchased. A neat school house was completed Jan. 1 and a term of school has just been closed. A newly planted orchard contains over 100,000 trees, largely apple trees, for use in planting out the orchards.

Sunnyslope has several natural conditions contributing to its popularity. One of the important things is the domestic water found at a depth of from 30 to 70 feet. This water is excellent and compares to the best found in wells. Another important condition is the grandeur of scenery with which it is surrounded. Lofty mountain peaks can be seen rising to a height of 9,000 feet.

Land adjoining Sunnyslope has been settled for years, and is in a high state of cultivation. The valley is not a wind-swept desert, where the rattlesnake and the horned toad are abundant. It is one of the most beautiful valleys in the United States and is about fifteen miles long by an average width of eight miles.

The man of family who wishes to become independent on a small farm, where he can enjoy all the advantages of both city and farm life combined, will find the ideal location in the Powder River Valley.

"Transformation" is the title of a beautiful piece of literature which tells the story and may be had by addressing the Baker Irrigation Company, at Baker City, Oregon.

GOVERNMENT AWARDS CONTRACT.

The Bucyrus Company, of Milwaukee, has secured the contract for a steam dredge for use by the Reclamation Service in enlarging the main canal of the Sunnyside project in Washington. Specifications call for a three and one-half cubic foot steam driven dredge with buckets of the continuous type. The contract figure is $28,010.

ATTALIA, WASHINGTON
On the Walla Walla.

Columbia Canal Company Revives Old Project—Attalia to Be Important Rail Center—Land Sales Increase—Company Insures Land Improvement by Settlers.

In the early days of irrigation enterprises, numerous projects were launched by men of limited means who were far-seeing enough to discern the advantages of investments of this character, and much effort was expended to interest capital to assist them in carrying out their plans. Many men of integrity and energy fell down in their efforts in this direction, while on the other hand many were successful in raising funds and brought the projects to a point where capital was easily secured and work of development was carried on to a point where purchasers were readily satisfied of the feasibility of home building thereunder. Among the many projects launched was one on the Walla Walla River in Washington, whose object it was to water a large tract of land along that stream and the Columbia River, in the western part of Walla Walla County.

The Government appropriated to this company 200 cubic feet of water per second from the Walla Walla

Attalia Giant Sage Brush—An Indication of Good Soil.

River, this water to be taken out at a point about ten miles above where this stream empties into the Columbia. Using as a basis the government allotment of one cubic foot per second for 160 acres, this appropriation would be sufficient to cover 32,000 acres of land, and as it was the intention of the company to cover less than one-half of that amount, an abundance of water was assured to the settlers.

During the year 1904, while looking over various sections of the states of Washington and Oregon, Mr. U. K. Loose, Winfield Smith of Seattle and J. D. Bassett of Ritzville, together with other parties, found the project along the Walla Walla River in a then incomplete state and the company without sufficient capital to carry it through.

Realizing that in this valley lies some of the richest land in the state which brought under irrigation would produce immense crops, this group of men purchased the interest of the old company and formed the "Columbia Canal Company" and carried on the work where others had left off.

A solid concrete dam across the Walla Walla River, 11½ feet wide at its base and 20 feet high, with head gates of steel and an intake several hundred feet long, also built of concrete, were put in and the work was of such a character that it is the opinion of the promoters that it will last forever. The heavy floods in the spring have never developed any indication of weakness in the construction of this work.

From this dam the water is carried through open ditches, flumes and tunnels to the lands in the valley below. The main ditch is 14 feet wide at the bottom, 6 feet deep and 32 feet wide on top, the slopes being 1½ to the foot, having a conveying capacity of double the

Harvesting Alfalfa Near Attalia, Wash.—Young Orchard in Distance.

amount of water required to irrigate the amount of land under the canal.

One of the long flumes is built on concrete piers and timbers and will stand for years. The drop at the end of the flume is a siphon carrying the water under the O. R. & N. tracks and then into an open ditch on the hillside. The first laterals were built in open ditches and flumes, which supplied the few people in the valley during the first two years after the ditch had been completed, it being the intention of the company to develop a few of the lands and prove what could be done in the valley.

The sales were not pushed until the season of 1908, when the sales management was put in the hands of R. C. Dahlhjelm, the valley at this time having proved beyond a doubt what could be done with proper irrigation and cultivation.

A great many of the small western streams show a

Railroad Construction Work on "North Bank" Road Near Attalia, Wash.

tendency to run low for two or three weeks the latter part of July and the first of August. Realizing that this might happen on the Walla Walla River, the company in the fall of 1908 installed an immense pumping plant on the Columbia River, this plant to serve as a supplement and to be used only in emergency cases.

The pipe connecting this plant with the main canal serves two purposes. During the natural flow of the canal it is used as one of the main laterals supplying about 400 acres of land, giving pressure so lawn sprinklers can be used in the yards as handily as on a city lot. In case of emergency the pumps are started on the Columbia River and the water forced back through this pipe into the canal above.

It is the intention of the Columbia Canal Company to use a pipe system over the entire tract and any new laterals which will be put in in the future will be of pipe, the old ones being replaced with the new system as soon as necessary.

It was not only the possibility of developing an irrigated district which appealed to the promoters of the Columbia Canal Company, but the location was such that a railroad center was sure to come, there being only one gateway from the upper Columbia district to Oregon. The Washington & Columbia River Railroad and the O. R. & N. were already operating trains through this district. Later the North Bank, built through the Columbia River Valley and is operating trains over the Northern Pacific tracks through Attalia. A few weeks ago the North Coast Railroad started the construction of a bridge across the Columbia River just above Attalia and have completed their grade for roadbed and bought sixteen acres of land to be used for switch yards and terminal purposes.

Therefore, the foresight of the promoters of Attalia has already been brought to realization and a thriving little town is well established.

During the month of June, 1908, Mr. Dahlhjelm took a trip to Minneapolis in the interest of the company, the object being to see whether or not there was an interest in western fruit lands. Through a little advertising and mingling with the people he found that hundreds were then planning to move to the State of Washington. As a result of this visit, he opened offices in Minneapolis and conducted excursions during the late fall and early winter, with the result that a large majority of the people who went to look over the Attalia lands invested.

Every month saw an increase in the sales and the Dahlhjelm Company now have offices in Minneapolis, St. Paul, Duluth, Winnipeg, Sioux City, Ortonville and Dunkirk and are operating in Chicago as the Dahlhjelm Rowell & Company.

The extensive advertising campaign which is being carried on by these offices are certain to place Attalia foremost among the irrigated districts of the west. So many districts are held back for the reason that a great many of the lands lie undeveloped. Those who have bought lands at Attalia must improve them within a certain length of time and those who are unable to do so themselves are able to make arrangements with the Canal Company to care for their lands for one or more years.

Famous Columbia River Gap Near Attalia, Wash.

CATALOGUE OF SPRAYING PUMPS.

We are just in receipt of a handsome catalogue compiled by The Deming Company of Salem, Ohio, giving full details of their spray pumps, nozzles and appliances. The catalogue contains a very complete 12-page spraying chart, also gives sectional and detail views of several of the pumps, and illustrates many of them in action.

It is printed in two colors, with shaded illustrations, making a very fine appearance. The catalogue states that these spray pumps can be used to great advantage for whitewashing in mills, factories, warehouses, etc.

The Deming Company also manufacture a very complete line of hand and windmill pumps, hydraulic rams, and triplex and deep well power pumps for various duties and for operation by any power.

Interesting literature will be sent to any parties desiring information on any Deming pumps, on receipt of their request.

Send $2.50 for The Irrigation Age 1 year, and the Primer of Irrigation

BLUEWATER VALLEY
NEW MEXICO

Favorable Transportation Facilities—Strong Home Demand for Products—Fruits and Grains Yield Heavy—Decomposed Lava Dust Supplies Rich Fertilizer—Water Supply Permanent and Unlimited—Grandeur of Scenery Attracts Tourists.

Irrigation has developed with such rapid strides in the past two years that practically everyone in the United States is familiar with the subject, and all concede that he who owns an irrigated farm is lucky, and those who do not own an irrigated farm have made up their mind that "when the good ship comes in" they will acquire one. In the selection of irrigated land, however, it is well to select the soil that will return the largest profit to the purchaser and become a "nest egg" for the future.

Returns from the lands, of course, depend upon the price received from the crops raised. In this respect the Bluewater Valley, in New Mexico, is as favorably situated as any tract of irrigated land in the west. Located 100 miles west of Albuquerque, upon the main line of the Santa Fe Railroad, near the junction of its lines, the farmer in the Bluewater Valley has all the advantages of quick transportation. Moreover, the home market will consume, at high prices, all the forage crops which he can possibly raise. The Bluewater Valley is a garden spot, an oasis in the midst of a territory two hundred miles square where the only other industries are lumbering, mining and cattle and sheep raising.

Lumber and mining operations employ hundreds of men who produce nothing agriculturally but are large consumers. Fresh vegetables and all other agricultural products for these camps bring high prices. One who has lived upon canned milk and canned peas and canned corn and canned tomatoes (in fact "canned everything" with the exception of the air he breathes) can appreciate the avidity with which the mining and the lumber population, as well as the stock men, buy fresh vegetables.

There are great opportunities in the Bluewater Valley for dairying and poultry. Milk in the nearby towns brings as high as forty cents per gallon, butter forty cents per pound and eggs from 30 to 90 cents per dozen.

There is a large area of unfenced grazing lands in the Bluewater Valley, which are roamed at will by the cattle of the settlers. The dairying industry can be carried on cheaply and profitably. The Bluewater Development Company maintains as fine an experimental farm as can be found anywhere. All the vegetables and forage crops are demonstrated in their highest stage of perfection, and the farm is in charge of two experts who advise and assist new settlers.

Lands in the valley are practically level, and as large tracts have been cultivated there is very little clearing of sage brush to be done. Soil is a deep, rich, dark red loam, strongly impregnated with magnesia salts and oxide of iron, derived from decomposed lava dust, the richest fertilizer known.

Fruits being grown in the Bluewater Valley this year are apples, cherries, plums and pears, strawberries, raspberries, currants and gooseberries. Apples should be especially fine on account of the color derived from the decomposed lava in the soil.

Of the forage crops, alfalfa, wheat, oats, barley and Indian corn thrive and produce large yields. Oats run 100 bushels per acre and have been selling for the last two years at 90 cents per bushel. Wheat will yield 40 bushels per acre. Potatoes and sugar beets are probably the best root crops. The potatoes are large, smooth, solid and meaty. The seed planted is from the Red River Valley and the non-irrigated seed from Greeley, Colorado.

View of Bluewater Reservoir.

Sugar beets have been produced with a sugar content of more than 20 per cent, with an exceptionally heavy tonnage to the acre. Arrangements have been made with the Colorado factories whereby beets from the Bluewater Valley can be marketed advantageously. This is effected by an absorption of a portion of the freight rates by the sugar factories themselves.

In respect to water and facilities for its storage, the Bluewater Valley is especially favored. Lands are watered from a fine reservoir, first located by the United States geological survey. It consists of a large deep basin covering 3,435 acres, the only outlet to which is through a narrow, rock-ribbed canyon. Across the mouth of this canyon a dam has been constructed, forming an impounding basin. The outlet is a tunnel driven

through solid rock cliffs from the bottom of the reservoir into the canyon. The gates are located in this solid rock tunnel, affording a safe and ample outlet to the reservoir.

After leaving the reservoir the water flows down the Bluewater canyon, which is rock on the sides and bottom, and, owing to springs of water in the canyon, more water is delivered at the lands in the valley twelve miles away than is turned loose through the tunnel at the reservoir, the usual loss from seepage and evaporation en route being completely overcome. The reservoir lies at an altitude of 1,000 feet higher than the Bluewater Valley and twelve miles distant. It drains an area of approximately 240 square miles of heavily timbered watershed.

Sugar Beets and Potatoes, Bluewater Valley.

Approximately 25,000 acres of irrigable land are comprised in the Bluewater Valley. At present there are perhaps thirty-five families farming in the valley. A good school, in charge of a competent male teacher, main-line train service, daily mail, telegraph and telephone service make the Bluewater Valley an exceptionally pleasant place to live.

The scenery surrounding the valley is also beautiful. Mt. Taylor rises at the edge of the valley to an altitude of 12,000 feet, and is flanked on both sides by a row of smaller, more regular, brilliantly colored buttes, completely enclosing the valley upon the east and upon the northeast and southern sides. On the western side low foothills, upon which there is excellent grazing, extend for a few miles, until they are met abruptly by a line of limestone buttes.

The Bluewater Development Company is extending every courtesy and inducement to intending purchasers. The farms so far purchased range in size from 10 to 100 acres. Terms of purchase are very easy, embodying a small cash payment per acre, with the balance of the payments extending over a term of years at 6 per cent interest.

Settlers under the Bluewater project have the advantage of being under a reservoir thoroughly investigated and surveyed and the engineering data for which was compiled by the United States geological survey, under the direction of the Department of the Interior. The construction is also authorized by and under the direct inspection of the territorial irrigation engineer and board of water commissioners. All plans and specifications are approved by them. Irrigation has been practiced in New Mexico for over four hundred years, and consequently the territorial laws protecting the rights of water users are perhaps more perfect than in any other portion of the United States.

SIGNS OF GROWING TRADE.

Forced to largely increase its output in order to supply the rapidly growing demand for its products, the Dempster Mill Manufacturing Company, makers of water supplies, well machines and implements, at Beatrice, Neb., is working on a large addition to its plant and is making preparations to construct two more additions during the coming summer.

In the foundry addition now under way the company will install a complete trolley system for carrying molten metal from cupolas to the various parts of the foundry. This portion of the plant will then consist of the following departments: Main foundry, 70x150 feet; rattler and grinding room, 50x60 feet; core room, 30x65 feet; brass foundry, 30x30 feet. The new addition will be 80x150 feet. The company plans another addition to the south warehouse 30x140 feet.

According to its present plans the company will also erect a new implement factory 65x150 feet and three stories in height. All of the improvements will be of concrete and brick construction and about 100 new hands will be employed before the close of the summer.

NEWS FROM THE LOWER YAKIMA.

The lower Yakima Irrigation Company has just placed 16,000 acres of land at Richmond, nine miles from Kennewick, Wash., under the ditch. T. A. Du Bois of Spokane declares the company has spent $300,000 in acquiring the land and putting it under water. He added: "We have only 15 miles of ditches, the shortest amount in the entire west for the acreage covered. There is a good town already at Richmond, and it is going ahead rapidly. In this district we make a specialty of grapes, apples and peaches. The company will soon acquire other holdings to the north and put water on them."

REORGANIZE CUSTER COUNTY COMPANY.

Idaho Irrigation & Power Co. Takes Over Old Project.

The Idaho Irrigation & Power Company, incorporated under the state laws of Washington, with Benjamin E. Hervey of Spokane, has acquired the Custer County Irrigation Company's holdings in Custer County, Idaho, by guaranteeing to the residents a new irrigation plant to water 14,455 acres. This will involve an expenditure of $150,000, the plant to be in operation within nine months. Mr. Hervey has associated with him W. C. Reeder, O. R. Haight and W. S. Egbors of Ritzville, Wash.; J. E. Reeder and Claude Reeder of Tacoma; B. L. Reeder of Portland, and Albert Ewert of Harrison, Idaho.

The company paid approximately $43,000 for the deeded water rights, improvements of the Idaho company and other expenses necessitated, besides the $16,000 of the former company incorporators. It has fixed the price of water rights on the new project as $25 an acre, payable in 10 years on the instalment plan.

The water supply for the project is secured from the Little Lost River and is to be fed through canals into a big reservoir to be located on Dry Creek. The Custer County Irrigation Company, organized under the state laws of Idaho, was unable to complete the project.

Alaska-Yukon-Pacific Exposition.

Orient and Occident Send Complete Exhibits—"Pay Streak" Calls for Huge Expenditures—Special Music by Manila Constabulary Band.

The installation of exhibits in the buildings of the Alaska-Yukon-Pacific Exposition, the work of an army of laborers and experts for nearly twelve months, was fully completed on June 1.

In interesting European countries in the exposition, Sr. Carlo Marchetti has devoted the past year to work on the continent, and his efforts have resulted in complete displays from every nation of Europe. In housing these exhibits it has been necessary to increase the original space prepared for foreign exhibitors.

In elaborateness, the displays of the territories of Alaska and Hawaii surpass all expectations. The two buildings representing these countries are a part of the government group, and have been especially designed for the requirements of the territories.

The Live Stock Show will be held on the exposition grounds from September 27th to October 9th, and this event has drawn entries from all parts of the United States and Canada.

Individual state, national, civic and county days will be held on set dates during the fair, and in each of these programs will be arranged with special reference to the occasion.

The musical features will be an attractive part of the exposition, and during the season the very finest musical organizations of the United States will be heard. Innes, Liberatti's and Ellery's bands will divide the time, and at various dates other noted bands will be heard in concert and regular performances. Among these will be the Constabulary Band of Manila and the Mexican National Band.

Geyser Basin, Alaska-Yukon-Pacific Exposition.

The Oriental consignments of exhibit material are ready for viewing, and all state, county and civic buildings are occupied. In the Pay Streak attractions $1,500,000 have been invested, and among its amusement novelties are numbered the very finest and elaborate spectacular events produced.

For athletic events, the Stadium has been built on the shores of Lake Washington, with a seating capacity of twenty thousand spectators. The formal gardens, lawns, parks and shrubbery planting were entirely finished on the first of April, and present a magnificent appearance. The lake water front has a number of boat landings for lake steamers, and facilities for yachts, canoes and all pleasure craft are ample and complete.

The summer weather of Puget Sound is ideal; the extreme heat of the middle and eastern states is not experienced in the northwest, and the rainfall is not excessive. No country of the world offers superior attractions to the sportsman than does the territory about Seattle. The trout and salmon fishing is open throughout the spring, summer and fall, and none of the streams are restricted. Within two hours' distance of the city some of the very best fishing rivers are met with, and in the waters of Lakes Washington and Union trout and bass are taken in number.

For side trips and outing excursions, Puget Sound, with its hundreds of bays, rivers and summer resorts, cannot be equalled. Mountain climbing, yachting, canoeing and camp-

ing present interesting fields for their devotees, and the great beauty of it all is increased by the opportunities for traveling routes untramped except by pioneers.

In making the trip across the United States to the Pacific Coast, railway rates have been established granting unusual stopover privileges and choice of route in going and coming. The Yellowstone National Park will be kept open a fortnight longer than the regular season, and this will enable the visitor to see this wonderland under exceptional conditions.

By the judicious selection of routes in making the cross-country journey, a considerable part of some of the great irrigation projects recently carried out may be seen to advantage. One instance of this nature will be seen in the trip through the Twin Falls district in southern Idaho. This country is intersected by the Oregon Short Line, and an inspection of the mammoth irrigation system inaugurated will constitute an interesting and valuable feature of an exposition visit.

Seattle has kept pace with the exposition in preparing for visitors during the summer months. The hotel service has been greatly enlarged, and is now sufficient to care for all guests and visitors. By agreement among hotel proprietors and restaurant keepers, no increase in the ordinary tariff for entertainment will be made. These prices are moderate, and vary sufficiently to suit all purses. The exposition grounds are within twenty minutes' ride by street car from the business center, and four surface electric lines will run a one-minute service. In addition to this method of reaching the grounds, two railways will operate a half hourly service between the central station and the fair. The trip may also be made by way of the cable car lines and lake excursion boats.

All boat service on Puget Sound waters has been increased, and the summer excursion routes will cover all the picturesque and delightful voyages of the great inland sea.

NOTES ON THE EXHIBITS.

Japan has spent 200,000 yen upon its building and in bringing its exhibit to the Alaska-Yukon-Pacific Exposition.

The Alaska-Yukon-Pacific Exposition is the first world's fair which has not asked financial assistance of the government. Uncle Sam is spending $600,000, but is doing it himself on his own exhibits and buildings.

One hundred thousand cactus dahlia plants are used in one single feature of the landscape gardening of the exposition.

Eleven airships of various types have already entered for the airship show.

"Old Faithful," the famous Yellowstone Park geyser, will be reproduced in Geyser Basin. It will spout water, illuminated at night by electric lamps of different colors, a height of 150 feet in the air.

Gold dust valued at $5,000,000 has arrived in Seattle, where it will make one of the exhibits. It was brought out over the winter trail from Dawson City, Nome and Fairbanks.

There will be 85 dancing men and women in the Turkish Village, making it the biggest oriental concession put on at any exposition.

Tourists bound for the Alaska-Yukon-Pacific Exposition, which opens in Seattle in June, will have a splendid opportunity to take the world famous summer excursion along the glaciers and mountains of the Alaskan coast.

The Seattle chamber of commerce will conduct an information bureau in Seattle for the benefit of visitors to the city. Agents will meet all boats and trains, and in this way persons who visit the metropolis of the State of Washington this summer will be assured of reasonable rates at the hotels and lodging houses.

Colonnade of the Palace of Agriculture, Alaska-Yukon-Pacific Exposition.

Among the interesting works of art is a statue of "Old Jennie," last of the Rogue River Indians.

One of the interesting exhibits is the display of the American Bankers' Association. The exhibit will be highly educational in character. A meeting of the bankers' associations of Washington, Oregon, Montana and Idaho will be held in Seattle this summer.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

Supreme Court Decisions

Irrigation Cases

DEDICATION OF WATER.—

Where water has been delivered to lands under a rental and distribution, and has been used and applied by the landowner under such rental for the purposes of raising crops, the right to such use becomes a dedication within the meaning of section 4 of article 15 of the Constitution, and the user and consumer is entitled to the continued use thereafter on payment of the rental rates established in conformity with law.—*Niday* v. *Barker*. Supreme Court of Idaho. 101 Pacific 254.

PRESUMPTION THAT CANAL COMPANY HAD SUFFICIENT WATER.—

The fact that a canal company has furnished and delivered water to a consumer for the purpose of raising crops so as to amount to a dedication of the use within contemplation of the provision of section 4 of article 15 of the Constitution raises the prima facie presumption that the company so furnishing and delivering water had that quantity of water over and above the amount required and previously appropriated and dedicated to other users and consumers from the same canal.—*Niday* v. *Barker*. Supreme Court of Idaho. 101 Pacific 254.

WATER RIGHTS.—

Where the evidence shows that any rights of plaintiffs to the use of water from a city irrigation ditch are based on a contract, a decree that plaintiffs are owners by appropriation of a certain quantity of water, and that defendants must turn the same out of the city ditch, so that it will reach plaintiff's water box, is erroneous.—*City and County of Denver* v. *Walker*. Supreme Court of Colorado. 101 Pacific 348.

EASEMENT IN IRRIGATING DITCH.—

Where one having an easement in the use of an irrigating ditch appurtenant to his 80-acre estate, over which sufficient water had been distributed by means of temporary channels, divided the estate, and conveyed a 10-acre tract not attingent to the ditch, together with the appurtenant one-eighth interest in the water right, the easement became appurtenant to the tract conveyed, the grantee's right being one arising in grant and founded upon the conditions existing when he purchased; and, if, in the enjoyment of such easement, it became proper to carry a ditch to the 10 acres over any portion of the original estate, such estate became the servient tenement for this purpose; the single restriction upon the method of enjoyment being that the extension ditch should be constructed so as to create the least practical interference with the freehold of the servient tenement.—*Tarpey* v. *Lynch*. Supreme Court of California. 101 Pacific 10.

SALE OF WATER.—

Where a party is entitled to water from a ditch company, and does everything that the Constitution and laws of the state require him to do in order to get it, the water company is bound to deliver him the water, and cannot require him to sign a special contract binding him to do things which the law does not require him to do in order to get the water.—*Green* v. *Byers*. Supreme Court of Idaho. 101 Pacific 79.

DIVERSION—USE OF DAM.—

A riparian owner having a right to a part of the water of a stream may change the flow by a dam on his own property, if he does not thus divert more water than he is entitled to.—*Arroyo Ditch & Water Co.* v. *Baldwin*. Supreme Court of California. 100 Pacific 874.

IRRIGATION RIGHTS.—

An irrigation company, whose incorporators and stockholders were owners of the water for irrigation, acquired either by prescription or as riparian owners, may maintain an action to quiet title to such water as against an upper riparian owner.—*Arroya Ditch & Water Co.* v. *Baldwin*, Supreme Court of California. 100 Pacific 874.

VALIDITY OF IRRIGATION BONDS UNDER WRIGHT ACT.—

Under Wright Act (St. 1887, p. 35, c. 34) Sec. 15, fixing the term for which bonds of an irrigation district shall run, bonds fixing a shorter or longer term of payment would be invalid.—*Stowell* v. *Rialto Irr. Dist.* Supreme Court of California. 100 Pacific 248.

RIGHT OF WAY.—

One who has not acquired a right of way for an irrigation canal over the public lands of the United States prior to their entry as a homestead, must arrange for such right of way with the entryman or take proper proceedings to appropriate the land for that purpose.—*Rasmussen* v. *Blust*. Supreme Court of Nebraska. 120 Northwestern 184.

POLLUTION OF WATERCOURSE.—

Where defendant built dams across bayous on his land for irrigating purposes, and, after the water which had risen on the lands of others receded, a disagreeable smell arose, though no intent to produce such smell was shown, a criminal prosecution would not lie.—*Stacy* v. *State*. Court of Criminal Appeals of Texas. 114 Southwestern 807.

RIGHT TO SUE FOR POLLUTION OF STREAM.—

The owner of arid agricultural lands, having a right to use the water of a river for irrigation purposes, has such an interest in the water different from that of the general public as entitles him to maintain an action to restrain deposits of mineral debris in streams tributary to such river, which would render the water unfit for use.—*Arizona Copper Co., Ltd.*, v. *Gillespie*. Supreme Court of Arizona. 100 Pacific 465.

VENDOR'S LIABILITY.—

The original owner of land for which water was appropriated is not liable, in an action by a purchaser of one of the tracts into which the land was divided to recover for wrongful diversion of water, for shortage of water in the natural stream, nor because of that shortage for an insufficient supply to irrigate such tract, nor for wrongful acts of others.—*Booth* v. *Trager*. Supreme Court of Colorado. 99 Pacific 60.

ESTOPPEL OF DITCH LICENSE.—

Where defendant's officers, knowing that plaintiff's assignors intended to lay out an irrigation canal across defendant's land, assented to, aided, and encouraged the performance of the work, on which plaintiff's assignors expended considerable money, defendant was thereafter estopped to deny the granting of a parol license for such canal.—*Miller & Lux* v. *Kern County Land Co.* Supreme Court of California. 99 Pacific 179.

PRIOR APPROPRIATORS NOT USING ALL WATER—

It is the policy of the law to prevent the waste of water; and, when prior appropriators of a canal are not using all of the water to which they are entitled, the canal company may supply such water to any other applicant therefor, but by so doing such applicant does not become vested with a right which can in any manner interfere with the right of the prior appropriator.—*Gerber* v. *Nampa & Meridian Irr. Dist.* Supreme Court of Idaho. 100 Pacific 80.

RIGHT TO SUPPLY OF WATER.—

Under the provisions of section 4, article 15, of the constitution of Idaho, providing for the sale, rental, or distribution of water, and also providing that such sale, rental, or distribution when once made shall be deemed an exclusive dedication to such use, it was not intended to compel a canal company that had already sufficient customers to use all of the water the capacity of its canal would carry to perpetually furnish water to anyone to whom it had furnished water at times when its regular customers did not require it.—*Gerber* v. *Nampa & Meridian Irr. Dist.* Supreme Court of Idaho. 100 Pacific 80.

SALE OF IRRIGATION BONDS.—

Wright Act (St. 1887, p. 36, c. 34), Sec. 16, authorizes irrigation district boards to sell bonds from time to time, to raise money to construct canals and works, to acquire property and rights, and otherwise to fully carry out the purposes of the act, and declares that such sales shall be to the highest responsible bidder, except that no bonds shall be sold for less than 90 per cent of their face value; and section 12 provides that the board may acquire by purchase or condemnation lands and waters and other property necessary to construct, use, supply, repair and improve its canal or works, including canals and works constructed, and being constructed by private owners. *Held*, that where an irrigation district contracted with a land and water company

for the transfer to the district at different times of specific water rights with completed pipe lines and rights of way necessary to the use and enjoyment of the rights transferred, to be paid in bonds which were to be issued in each instance only on the delivery of a deed conveying the property, all construction to be completed by the water company, the bonds were validly issued.—*Stowell* v. *Rialto Irr. Dist.* Supreme Court of California. 100 Pacific 248.

PAYMENT OF IRRIGATION BONDS UNDER WRIGHT ACT.—

Wright Act (St. 1887, p. 35, c. 34), Sec. 15, declares that bonds of irrigation districts shall be payable in installments, to-wit, beginning at the eleventh year and increasing in percentage annually, until the twentieth year the bonds shall be paid, and declares that they shall bear date at the time of their issue. Certain bonds in question recited that they were signed and issud on November 17, 1890, and attached to each were two series of coupons, one for interest payable semi-annually and the other for installments of principal maturing from the eleventh to the twentieth year after the issuance of the bonds. In the body of the bonds the district promised to pay $500 at the dates and on installments as follows, to-wit: At the expiration of 11 years from date 5 per cent; at the expiration of 12 years from date 6 per cent of said sum, etc.; and that such installments shall be paid "as provided in and only upon the surrender of the respective interest coupons" attached thereto, which provided for payment of an installment on January 1, 1902, and of subsequent installments on January 1 in successive years, both the body of the bond and the interest coupons making the interest payable on the first days of January and July beginning with July, 1891. The court found that the bonds were signed December 21, 1890, and that none of them were disposed of or delivered prior to the succeeding day. *Held*, that while the nominal date of the bonds was November 17, 1890, they did not begin to bear interest until January 1, 1891, and were to be regarded, therefore, as issued on that date, and, therefore, substantially complied with the statute.—*Stowel* v. *Rialto Irr. Dist.* Supreme Court of California. 100 Pacific 248.

PLEASANT COUNTRY HOME.

Gardens Surrounding George H. Payne's Farm House at Omaha Contain Rare Flowers.

Keenly alive to the beauties of nature, and a lover of flowers and plants, George H. Payne, president of the Payne Investment Company, at Omaha, has erected a palatial country home at his farm about ten miles west of that city where he spends his hours not demanded by his large business interests. In the accompanying cut is shown his garden, filled with

Country Residence of George H. Payne, President of the Payne Investment Co., Omaha (about ten miles west of that city).

flowers and ferns, in which Mr. Payne takes a pardonable pride.

The announcement has been made recently that Mr. Payne will take active charge of the sale of irrigated property for the Tri-State Land Company of North Platte Valley, Nebraska. From his past experience and success in handling western irrigated lands, it can be predicted that Mr. Payne will produce large sales of this new accession to his list of properties.

GARDEN CITY KANSAS and VICINITY

By R. H. FAXON.

(Continued from May Number.)

But with the development of irrigation in Colorado, and the rapid increase of the number of canals and of the area of land cultivated, there has been a diminution of water entering Kansas, except during time of flood, and through a great part of the growing season the river is completely dry, or at most contains stagnant pools. Many canals constructed at great expense have been abandoned, or maintained in such shiftless, inefficient manner that the farmers under them are disheartened from further attempts at cultivation by means of the water. It is possible that with proper management, and the diversion of water during flood, much of the land under the canals might be well watered once or twice a year, and produce better crops. With improved methods of irrigation, and with the incentive of the examples of successful farmers, some of these old canals will undoubtedly be utilized in the future."

Contained in one or two sentences of the above, however, is the germ of a great idea that will have done more for western Kansas in the next ten years to come than almost anything else—the practice of the system of winter irrigation. Dr. Newell says that with the development of Colorado irrigation "there has been a diminution of water entering Kansas, except during time of flood." He also says that "it is possible that with proper management, and the diversion of water during flood, much of the land under the canals might be well watered once or twice a year, and produce better crops."

Here is the ground for winter irrigation. The present season is seeing it put into force in western Kansas. Nearly every canal is carrying flood and excess water at different times this winter. The result will be well soaked ground in the spring, and early seeding, with little need for water until perhaps July or August. The effect on western Kansas agriculture cannot be estimated as a result of this policy, and it may confidently be predicted as one of the great hopes for the future.

After painting this not altogether pleasing picture in western Kansas, Dr. Newell then went on to point out the possible remedy. I have said above that when these words were written, there was no assurance or idea of the reclamation act, the Reclamation Service, the Garden City project, or that Dr. Newell himself would head the movement and install the project that helped transform Garden City and western Kansas from the picture he had drawn. And yet the time came, and largely through the methods and means predicted and suggested by Dr. Newell in the following observations:

"The valley lands of the Arkansas, however are not dependent upon the flowing waters, but possess a great advantage in that they can be irrigated from another source. This source is the enormous volume of water stored in underlying pervious soils, easily accessible by

wells or deep trenches. The existence of the subsurface waters of the river valleys of western Kansas has long been known, and has often been brought to public attention by popular articles and by official reports. Like every other natural resource, its importance, at one time little recognized, has been seized upon by the so-called "boomers" and exaggerated to the extent of creating distrust and depreciation. It is, however, one of the most important of the natural advantages of the State, and one upon which the foundations of prosperity must be carefully laid.

"By a thorough employment of the underground waters, with the best methods, much of the vacant land of the State will be utilized for agriculture, and the remainder can become a source of revenue, indirectly, at least. Taking the Arkansas valley, as best illustrating these conditions, the general statement may be made that water can be had everywhere within the valley at moderate depths, and in quantities such as to be inexhaustible to ordinary pumping machinery if properly installed. The volume and the rate of delivery are, of course, dependent largely upon the coarseness of the sands or gravels and upon the thickness and extent of the beds. Careful surveys have not as yet been made to determine the extent and character of these beds, but sufficient work has been done to obtain a broad comprehension of the subject"

With the accuracy and vision of the prophets of old, the commissioner of the general land office in the year 1868—his name was Joseph S. Wilson—foretold the glory and development of the upper Arkansas valley and of Garden City. To look now at the concluding paragraph of that portion of his report entitled, "Observations Accompanying Annual Report of 1868 of the Commissioner of the General Land Office on Forest Culture," and then to realize that this officer pointed out forty years ago the things that were scoffed at by most people within the past ten years, but which are now accomplished facts, leave nothing but admiration for his clear vision.

This officer of the government of forty years past and gone said in so many words that what western Kansas needed, and what it might have, in time, through the government, was a national forest, a determination of what was indisputable though not assured —the underground waters of the Arkansas river—and their utilization in agriculture. All of these things have since developed, and all within the past few years.

Here is what the commissioner says in concluding his report on forest culture:

"The production of a thriving forest at some point west of the one hundredth meridian, as it would establish the fact of its practicability, would, without doubt, contribute greatly to the value of our part of the domain.

Whether an enterprise of the kind, under the auspices of the government, would be likely to realize the expectations of its projectors, would depend very much upon the character of the persons who might be charged with the duties and responsibilities of the undertaking.

"It is scarcely to be doubted that the artesian well system might be rendered a great success on the plains. All the conditions appear favorable. The rainfall in the vicinity of the mountains is as great as in many portions of central Europe; and the melting snows on the highest crests feed the stream flowing from the sides of the mountains until late in the summer.

"The quantity of water thus flowing toward the plains is very great, but much the greatest quantity sinks in the sand within 50 or 100 miles of the foot of the mountains, and as the strata dip eastward, the water follows the same course, descending until it reaches an impermeable bed; and it seems very reasonable to suppose that there are reservoirs at various points beneath the surface of the plains that could be utilized by such wells.

"Even the water that falls on the plains themselves, not by any means inconsiderable, soon sinks into the parched and sandy soil, in much larger quantities than those carried off by drainage or evaporation.

"If this matter were thoroughly tested and the fact established, the confidence it would inspire as to the reclaimability of the least inviting portion of the plains would be very great, and would result in the rapid settlement and improvement of that part of our national territory."

For years the government and the wise men who lived on the Great Plains talked of these things, following the predictions contained in this musty old report I happened to run across. Nothing came of it, though the belief that the underground waters would eventually be utilized persisted in a later generation of government scientists and officials, and, locally, at Garden City, in the minds of such believers in the country as "Buffalo" Jones, I. L. Diesem, C. A. Schneider, and those who helped agitate the opinions and theories they had. The great development present today in the upper Arkansas valley and principally around Garden City is due to the fact that the things pointed out and predicted by that commissioner of the general land office forty years ago have been put in effect and force by the government and by private individuals. The proof that the underground waters existed and could be used; the establishment of successful experiments; the eventual Garden City reclamation project now in use; and, last of all, the Garden City national forest, carrying out the letter and the spirit of the suggestion and prophecy of Commissioner Wilson in 1868—these have given the upper Arkansas valley the impetus that is now carrying it forward to big things.

The great movement in Kansas now for forestation had its inception in the Arkansas valley west of the one hundredth meridian. Whatever there is the agitation for tree growing in Kansas is due to the constant and persistent agitation west of the one hundredth meridian. The want of trees, for use, for climatic effect, and for adornment, has been pathetic. All the power and strength of the west end is set in this direction, and the law will have to come. It had its start—its real start—given it when the national government established the Garden City national forest in the sand hills south of the Arkansas river, beginning at Garden City on the east and extending to the Colorado state line. The fact that thousands and thousands of western yellow pine and other sturdy young trees have been set out on this national forest in the past year—more than 5,000 of them in ten days in December, 1908—and that these trees grow and thrive; that they are produced from seed in a government nursery at Garden City; that the sandy

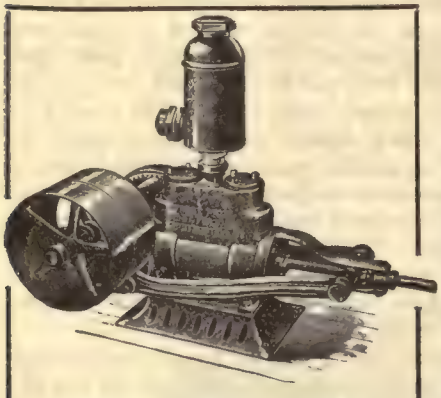
(Continued on page 313.)

ANNUAL ELECTION.

The annual election of officers of the Sacramento Valley Development Co. resulted as follows: President, Marshall Diggs; vice presidents, B. Cussick of Butte County, Morris Brooke of Sacramento County, Ben Rush of Solano County, A. L. Conrad of Tehama County, J. W. Kaerth of Colusa County, H. P. Stabler of Sutter County, T. B. Gibson of Yolo County, C. F. Aaron of Yuba County, E. B. Willis of Placer County; treasurer, C. F. Dillman; secretary, O. H. Miller.

The supervising engineer in charge of reclamation work in North Dakota has arranged for a detailed reconnaissance of the four principal streams in southwest North Dakota—the Little Missouri, Knife, Heart and Cannon Ball. A previous survey indicates that there is no large feasible project in connection with these streams, but it is thought there may be some small projects, and it is proposed to put in two or three small parties to locate irrigable lands and storage sites, if there be any.

A large acreage in the Lower Yellowstone Valley, particularly at the lower end, is being leveled and seeded and made ready for irrigation. Water has been turned in the main canal and workmen have been employed on each of the three lateral districts preparing for irrigation. The construction engineer is preparing to push work on the dam as soon as the spring flood has passed.



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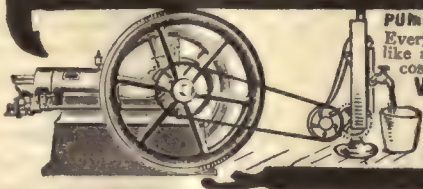
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country south of the river will, in this generation, even, be covered with a real forest, has driven public sentiment in western Kansas to state forestation, as well as national, and will prove the incentive to private effort, also.

In this same report back in 1868, when Commissioner Wilson uttered his strangely prophetic words above cited, this officer also said:

"A young forest of ten or twelve years' growth, if well taken care of, will furnish a very valuable shelter, and a sufficient number of them rightly distributed over a country will produce most of the effects contributed by larger trees, and will be continually improving. Nor should the length of time required to bring trees to maturity deter persons from undertaking the work of producing them.

"If the early settlers of Illinois, Nebraska, Kansas and other new states had suffered discouragements of that kind to control them, the many promising young groves, contributing so much to the value and beauty of so many homes in those states would never have been planted.

"If the enterprise of planting a few acres of forest each year by each proprietor of a farm too scarce of good timber were commenced and continued for ten or twenty years, the good that would be accomplished would be incalculable; and, after all, thirty or forty or fifty years—a very insignificant period of time in the age of a country—are long enough to produce trees of a size sufficient for nearly every purpose."

With equal wisdom, and with equal force of prophecy, Commissioner Wilson said in this same report of 1868—and it seems as though he must have had in mind the time when a great conservation movement like today would be in progress in this country—the following:

"The impression is a very general one in the older states that both droughts and violent rain storms are much more frequent than was formerly the case, while in some of the western states and territories, where timber has been increasing in quantity, the uniform testimony appears to be that the climate is improving in regularity, both as to moisture and temperature.

"Such is the experience in large portions of Illinois and Iowa, in the eastern part of Kansas and Nebraska, and in the valley of Salt Lake. But if the experience of various sections of our own country should be thought insufficient to justify any positive opinion on the subject, that of other and of older nations should at least admonish us that the utility of the forest is a question of very great importance, involving consequences, favorable or unfavorable, of the highest moment; that its removal in localities where it may be too abundant, and its preservation and reproduction in districts where it has been too much reduced, or has been entirely wanting, should receive the thoughtful care of every proprietor and everyone interested in the welfare of his country; that the indiscriminate felling of every grove from the fallacious idea of converting the land to more profitable uses, the carelessness of suffering accidental fires to destroy hundreds of acres of timber every year in the older states of the union, are acts of improvidence, the consequences of which will only be realized when their far-reaching effects shall have become fully developed in calamities such as have

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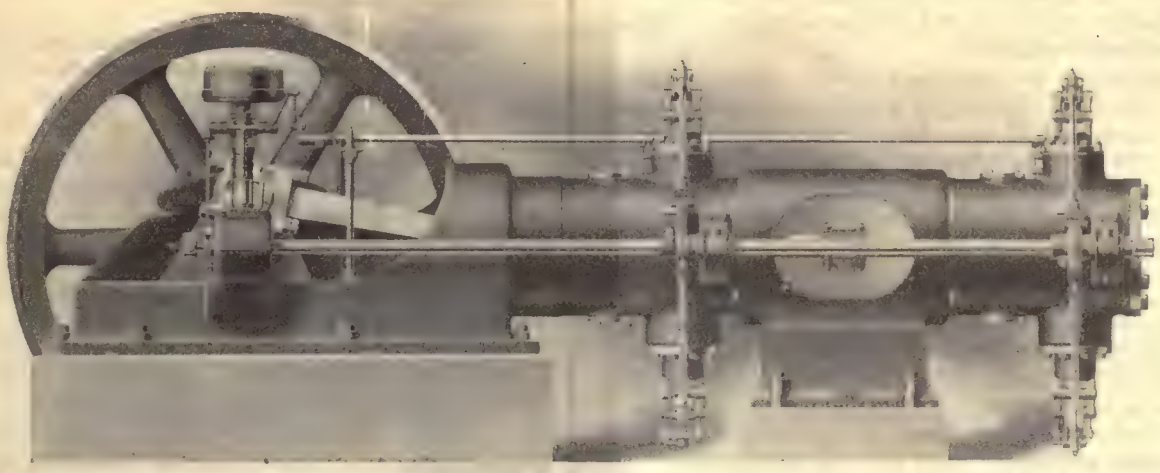

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compelled other nations to bestow upon the subject the consideration due only to the gravest matters of human concern."

Thus are the earliest predictions and warnings of the officers of the government, so long scorned by the pioneer and early inhabitant of the Great Plains Area, later put into effect so generously and so successfully in western Kansas, the cause of a high state of development today and the precursor of marked progress in state forestry particularly.

Where once was this waste of dry land, this desolate relict of the "boom," this country with little promise left, is now a mighty empire. The Arkansas Valley west of the one hundredth meridian, with Garden City as its capital, in Hamilton, Kearney and Finney counties, Kansas, averages about three miles in width. About 100,000 acres of land are therein contained. No body of land on earth is better, given the water that is now and is about to be available. Canals and irrigation ditches now irrigate completely more than 15,000 acres of this land. The ditches which Mr. Newell says went to waste—became dried streaks upon the level of the country—are now running with water. Even in winter months the lands are being drenched at intervals, for at last western Kansas has come to the greatest irrigation of all—winter irrigation. This saves at least one-third the water, and it saves time and labor in the spring and summer. An acre of land thoroughly soaked in the winter months, when water is available and man not so busy, is ready for the seeding in the spring, is easy of preparation, and the crop begins to grow at once without the added water for perhaps several months. Then when the dry spell begins, and water is scarce, and everyone wants it, not so much is required. It was only this year, under the force exerted by the preachers of the Department of Agriculture throughout the upper valley, and of some of the older and some of the younger men who have seen the effects in Colorado, that this system of winter irrigation began. The newspapers printed at Garden City have advocated for the past year, persistently and continuously, this policy which just over the line has demonstrated its effectiveness over and over again.

Besides the 100,000 acres in the Arkansas valley proper, there are the nearby uplands, comprising some 75,000 acres, and of these fully 25,000 are under irrigation. This makes a total of 40,000 acres, valley and nearby upland, irrigated, out of a grand total acreage of 175,000. And this is being yearly increased, this percentage.

Nearby and north of Garden City lies another mighty domain known as the "shallow water area." Water here lies from ten to twenty feet below the surface, and the lands are already cultivated and have on them prosperous homes and happy families. The advent of the new railroads will still further enhance the value and prosperity of these acres.

Alfalfa and sugar beets are the great products of the country west of the one hundredth meridian in the Arkansas valley country. The Garden City reclamation project of the government was the first great boon to the country and gave an impetus to it and to its peculiar agriculture and prosperity. Then came the sugar factory. This great institution, at Garden City, has just concluded its second season with profit to the company, the farmers, and the community and section. The fac-

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This wonderful country is developing fast. Churches and schools abound. The population is intelligent, Godfearing and law-abiding, and any man out there who is half a man has the opportunity to make himself independent.

Land in this great country is going fast. If you have any thought for the welfare of yourself or children, find out all about this opportunity to-day.

Send for our new folder with large map, and **also folders issued** by the private irrigation companies and by the United States Government Reclamation Service **giving all information about these lands, terms, etc. Free for the asking.** Study these folders and then **come with me** on my next excursion to the Big Horn Basin and see for yourself. My excursions, which I personally conduct, leave Omaha on the 1st and 3d Tuesday each month, on which days reduced railroad rates are in effect. My services are free to you.

Burlington Route

D. CLEM DEAVER, General Agent

Landseekers' Information Bureau,

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N. B.—The winter weather in the Basin Country is fine and lands can usually be seen to advantage all Winter.

tory cost a million dollars. It is modern, and is the finest of its kind in the country. Extensive improvements will be made the coming year. It has approximately a thousand tons daily capacity. It is independent. That is to say, it is neither allied to the Havemeyer nor Oxnard trusts.

The sugar company owns 30,000 acres of land in Finney and Kearny counties, Kansas. It has a gigantic reservoir—Lake McKinnie, called after the company's president. This is being added to this year. In this great lake are stored vast quantities of water which will be let out in the spring—some of it is going out over the acres this winter—and will flow in the various canals owned and controlled by the sugar company. The waters of the reservoir come during the winter from the Arkansas.

Besides this, the sugar company is now about to complete, on the south side of the river, just above Garden City, what is practically a duplication of the Garden City government reclamation project. This pumping station, with its seventeen separate wells, drawing the water from the underflow by electrically-driven pumps, will water about 5,000 additional acres, for beets and alfalfa and truck.

Truck, melons and the like, and cantaloupes equal to the famed Rockyford of Colorado, are grown each year in increasing quantities. Potatoes of the finest quality are raised in this valley. Quantities of corn, milo maize, wheat and other cereals come out of the soil each year. Stock of the finest kind is raised in this valley, the corn and the alfalfa and the beet pulp giving a blend to the meat that the Kansas City markets are always glad to get.

Add to these products and the thousands and thousands of revenue coming from them yearly, and to the great governmental and private improvements of the valley, the scores of hamlets, towns and small cities from the one hundredth meridian westward to the Colorado line, headed by Garden City, population 4,000; all filled with comfort and happiness and prosperity, and the fame of the valley is grasped at a thought and a glance. Given these, in the place formerly known as the Great American Desert, the Great Plains Area, west of the "deadline," where the buffalo once trod and the Indians hunted, where the sands drearily blew about, where the stretch seemed "monotonous" to our adventuresome lieutenant of the army of 1853, springing up out of the desolation and want painted by so eminent an authority as Frederick Haynes Newell but a scant half-generation ago, and there is ample and convincing proof that the spirit of the American and the heart and mind of him can conquer all things.

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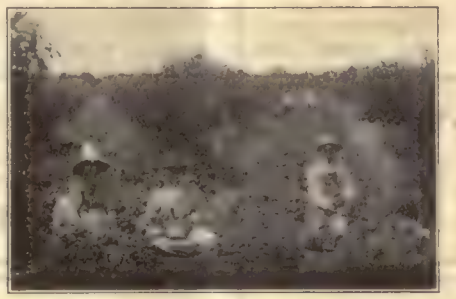

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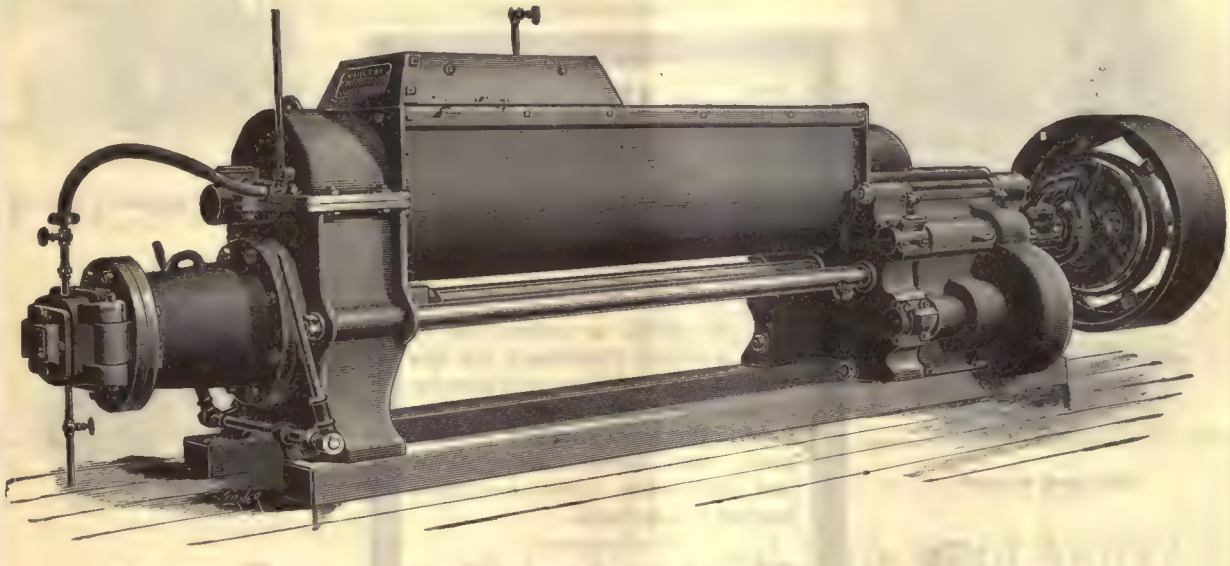

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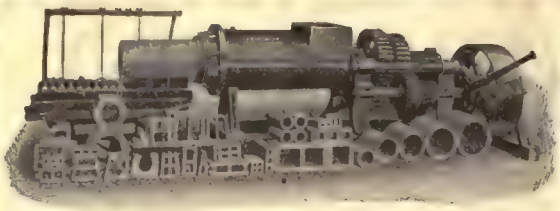

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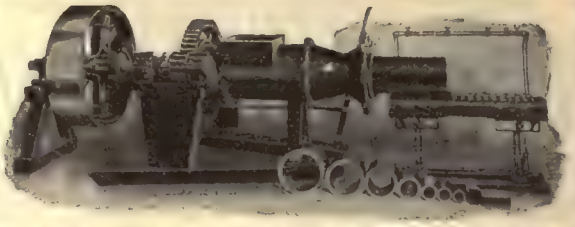

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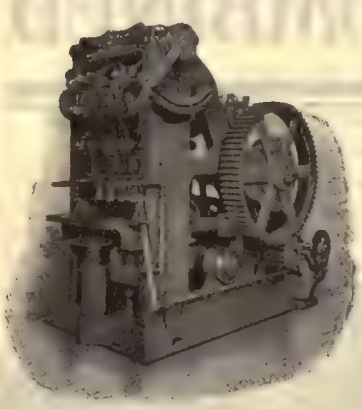

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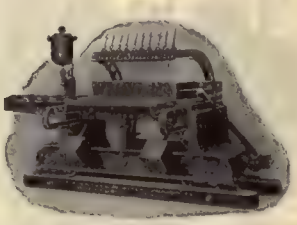

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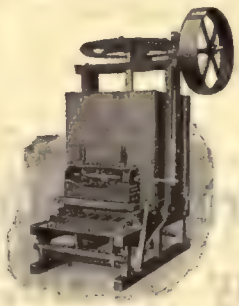

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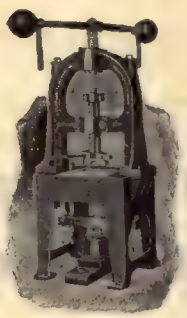

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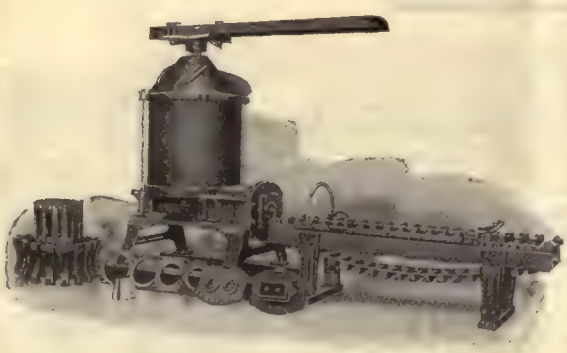

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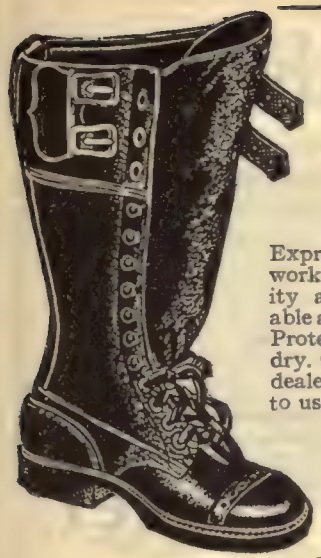

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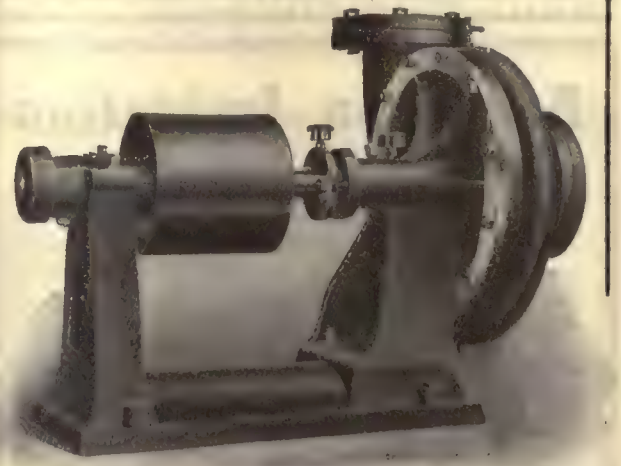

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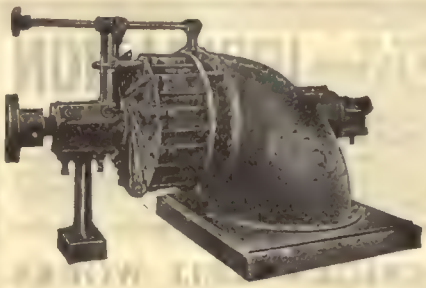

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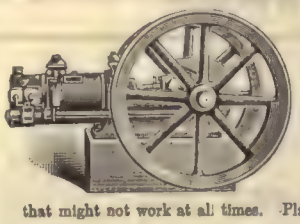

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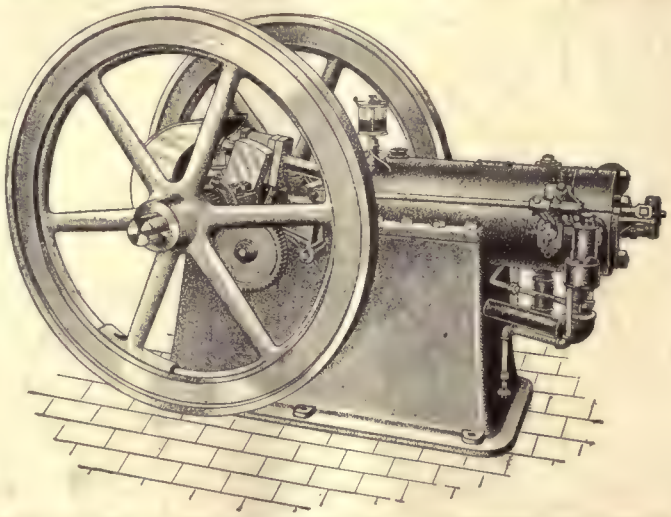

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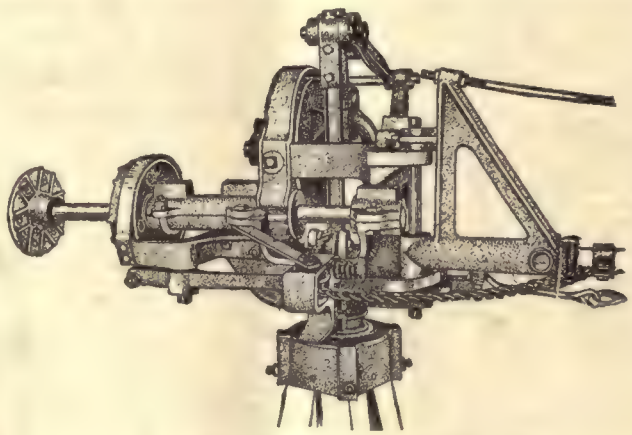

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VOL. XXIV — TITLE REGISTERED U.S.PATENT OFFICE — No 9

CHICAGO, JULY, 1909

"It Digs a NICE Engineer's Ditch"

said a man recently in looking at our photographs of AUSTIN DRAINAGE EXCAVATOR work. He meant a slur, of course. Well, we can take it, and more of the same kind. **What is an "engineer's ditch?"** It is a ditch dug true to line and grade, with sloping banks, wide berms and solid spoil banks. **It is a ditch so dug that the banks do not slide or cave, or the bottom fill with mud bars.** It is a ditch that carries the most water at the least possible cost for excavation.

Yes, the Austin Drainage Excavator digs "engineer's ditches" and it is the only ditching machine that does. We are content with this fact, for the "engineer's ditch" is also the **cheapest ditch for the contractor** and the **best ditch for the land owner.**

WE SELL OUTRIGHT OR LEASE

N. B. Agents wanted in unoccupied territory.

OUR FULL LINE COMPRISES

The Austin Levee Builder — The Austin Highway Ditcher — The Austin Drag Line Excavator
Austin Side Hill Ditcher — The Austin Drainage Excavator — The Austin Rolling Platform Traction
The Austin Orange Peel Ditcher — The Austin Stump Puller and Grubber

Send for Catalogue "S"

F. C. AUSTIN DRAINAGE EXCAVATOR CO., Railway Exchange Chicago, Ill.

Morris Machine Works

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Centrifugal Pumping Machinery, designed for any irrigating proposition. Send details or specifications of what is wanted and we will recommend a pumping outfit to supply the need.

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THE IRRIGATION AGE COMPANY, Publishers, Chicago, Ill.

THE 17TH NATIONAL IRRIGATION CONGRESS WILL BE HELD AT SPOKANE, WASH., AUG. 9-14, 1909.

Deming Power Pumps

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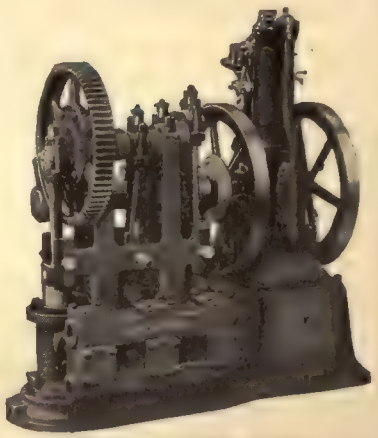
Efficient



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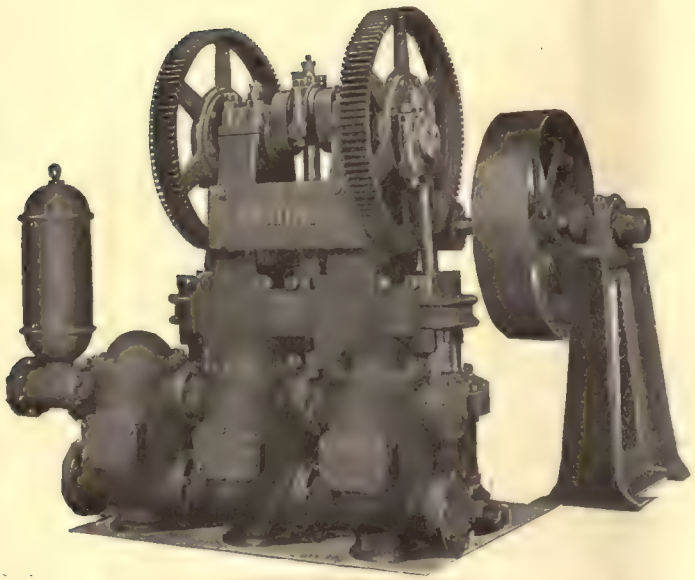

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A DEMING TRIPLEX POWER PUMP will elevate water through heads many times higher than any centrifugal pump possibly could, and for the same water delivered and under the same head, it will probably require from 40 to 50% ***less*** power than the centrifugal to operate. The efficiency of DEMING TRIPLEX PUMPS therefore is higher, and where power, say electricity, is costly, the saving on this item alone with the DEMING TRIPLEX PUMP will show a very good return on the investment at the end of the year.

All DEMING TRIPLEX and other POWER PUMPS are built to stand the hardest kind of duty, and are suitable for operation by ***any available power.*** A few lines to us, giving conditions under which your pump would have to work, will bring full information by return mail.

THE DEMING CO., - Salem, Ohio

HAND AND POWER PUMPS FOR ALL USES
Including Spray Pumps, Nozzles and Accessories

HENION AND HUBBELL, Chicago, Ill., General Western Agents
Other Agencies in All Principal Cities

The Temple Irrigation Equipments the most Economical and Certain Means of Lifting Water

55 YEARS' EXPERIENCE

Write us for Information and Prices—State Requirements

CENTRIFUGAL PUMP AND GASOLINE ENGINE IRRIGATION OUTFIT.

The Temple Water Elevators --The Temple Centrifugal Pumps

Manufacturers of all kinds of Hand and Windmill Pumps

Also Manufacturers Single Cylinder, Double Cylinder and Four Cylinder Gasoline or Kerosene Engines

Briefly stated the advantages of our Double Cylinder Engines are as follows:

First—They are more economical in the use of fuel. On light loads one cylinder can be used, reserving both cylinders for heavy loads.

Second—Although weighing about one-half the weight of a single cylinder engine of same rated capacity, vibrations are practically overcome, demonstrating conclusively that in proportion to strain the double cylinder "Master Workman" is the stronger engine.

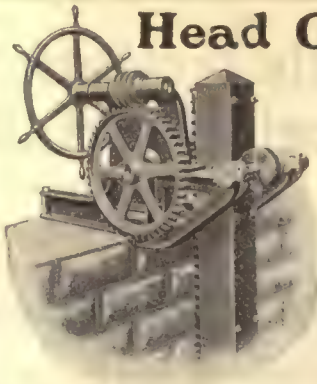
Third—The heavier weight of a single cylinder engine is due to the fact that it must have heavier fly-wheels in the horizontal type, and a longer, higher and consequently much heavier base than is required for the "Master Workman." The heavier the fly-wheels the greater the strain on the crankshaft, so you will realize that neither heavier fly-wheels or a heavier base contribute one iota to the strength of a single cylinder engine.

Fourth—When vibrations are overcome, as in the "Master Workman," the lighter the engine and the less cumbersome it is, the greater its sphere of usefulness and the cheaper and more convenient it can be handled.

Fifth—Lubrication in our engine is absolutely perfect. There is no forced lubrication, lubrication being by gravity. Certainty of lubrication is of vital importance in the steady running and operation of a gasoline engine.

Sixth—All mechanism is in full view, which will enable you to thoroughly understand the operation of a gasoline engine. The worst kind of complexity is concealed mechanism.

THE TEMPLE PUMP CO. Factory, 15th St. and 15th Place, near Canal St. Chicago, Ill., U. S. A.



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in all sizes and types for use in connection with timber or cast iron **Head Gates and Waste Gates** also a complete line of

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Catalog No. 25 is devoted exclusively to Gate Hoists. We also build the **New American Turbine**

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Otto Suction Gas Producers
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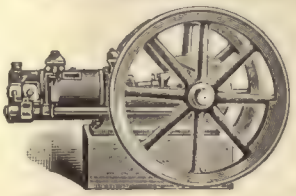
Are Reliable and Can Be Operated By Men of Ordinary Intelligence



J. A. Witter, Engineer for the Beaver Crossing Electric Light & Power Co., Beaver Crossing, Nebr., writes:

"Please send me a book of instructions on handling and running your gas producer and engine. I have been running this one on horse sense, but that might not work at all times. Plant works fine.

This man without special instructions, but with the use of "horse sense" causes his plant to work fine. There is a volume of praise for "OTTO" machinery in Mr. Witter's short letter.

The Otto Gas Engine Works
Philadelphia, Pa.

The Greatest Dairying Proposition

Land of the Tall Grass, the Big Red Clover and the Home of the Cow

We offer better opportunities for the farmer of small means to get into successful dairying than is offered in any other part of the United States.

With a cash capital of $1,000 any industrious farmer can become well-to-do in eight years on our Dairy Farm Land in Beltrami and Clearwater Counties, Minnesota.

Read What Experts Say of Our Land

"Destined to be the Greatest Dairy Country in the World."—W. M. HAYS, Asst. Secretary of Agriculture, Washington, D. C.

"The Almighty has set it apart for a Dairy Country."—EX-GOV. HOARD, Editor Hoard's Dairyman.

"There is no section of our State or Country that is better suited for dairying and the raising of diversified crops than the Northern part of Minnesota."—C. P. BULL, Professor of Agronomy, University of Minnesota.

"The Agricultural capabilities of this area (Northern Minnesota) is away beyond the popular estimate * * * The ability of the soil to produce good crops need not be questioned."—THOS. SHAW, N. W. Editor Orange Judd Farmer, and formerly Professor of Agriculture, University of Minnesota.

"In no other portion of the United States can Dairying be so profitably carried on."—R. A. MOORE, Professor of Agronomy, University of Wisconsin.

Write Us for Prices of Land and Further Particulars

The Northern Minnesota Dairy-Farm Land Co.

Tenney Block, Madison, Wis.

BITTER ROOT VALLEY, MONTANA

Home of the McIntosh Red Apple

Why is this Valley a Rich Land of Opportunity?

BECAUSE its Soil contains { 1.873% Nitrogen, 2.279% Ammonia, .186% Potash } *Armour's Standard Fertilizer* contains { .82% to 1.65% Nitrogen, 1% to 2% Ammonia }

BECAUSE the sun shines 300 days each year. Fruits, Grasses and Vegetables have plenty of Sunshine.

BECAUSE the water supply is an absolute certainty. A Rain when the ground and Crops need it.

BECAUSE Schools and Churches are well established. Missoula is the home of the State University.

Climate in winter and summer is even and perfect. Lands under irrigation not any higher in price than Eastern farm lands, and will produce three times the income.

Hamilton, Montana, March 15, 1909.

Mr. C. W. Mott, G. E. A., N. P. Ry., St. Paul, Minn.

Dear Sir: I send you these short statements showing what our farmers are doing in the Bitter Root Valley. All seem to be doing well.

Mr. Thos. Padden, of Darby, had a yield last season of over $1600 per acre from his McIntosh Red Apple trees. Mr. Ben Kress, of Hamilton, received this past year, from 130 nine-year old Red McIntosh apple trees, $1750. Mr. D. C. Bass, of Stevensville, has netted not less than $1000 and as high as $2100 during the past several years from 200 Transcendent crabs. Mr. D. C. Gray, of Hamilton, picked and packed over 100 boxes of Red McIntosh apples from five 16-year old trees; this is at the rate of $3000 gross, per acre, 80 trees to the acre. One 14-year old McIntosh bore 30 boxes; market price, $1.75 per box.

Yours truly, S. M. Ward.

What others have done should be convincing enough to prove what this rich valley will do FOR YOU if you would locate there. You can write to any of the people mentioned.

You can be **Independent,** and have a Home and a Good Income by Locating in this Wonderful Valley, which is traversed by the

NORTHERN PACIFIC RAILWAY

For information regarding Fares, Train Service, etc., Write to

A. M. CLELAND, Gen. Pass. Agt.,
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REMEMBER
the Seventeenth National Irrigation Congress
SPOKANE
AUGUST 9 to 14

For descriptive printed matter, Write to

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SUITABLE FOR ALL CLASSES OF WORK

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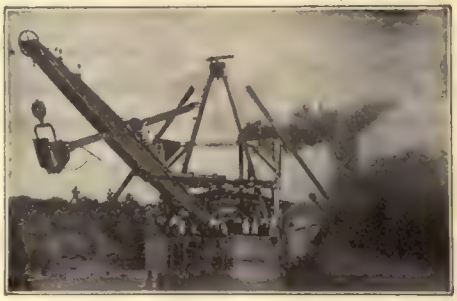

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The Marion Steam Shovel Co.,

MARION, OHIO

G. W. BARNHART, Western Manager
718 Monadnock Building, San Francisco, Cal.

F. H. HOPKINS & CO., Montreal, Quebec

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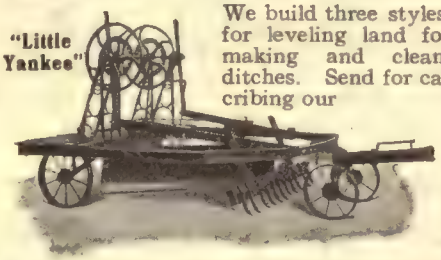

We build three styles of Graders for leveling land for irrigation, making and cleaning lateral ditches. Send for catalogue describing our

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The Ohio Road Machinery Company
Box F, Oberlin Ohio

The Chas. T. Manning Realty Co., Ltd.

SOLE SALES AGENTS

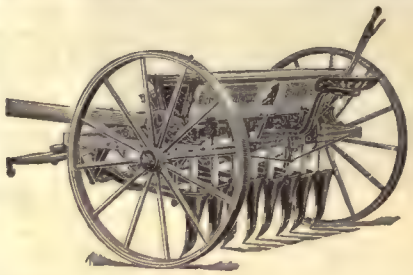
The Gooding Townsite Company, Ltd.

RESIDENCE LOTS.
BUSINESS LOCATIONS.

Improved—Irrigated Lands—Unimproved.

GOODING, IDAHO.

Send $2.50 for The Irrigation Age 1 year, and The Primer of Irrigation



HOE DRILLS

Plain and Fertilizer

HOOSIER HOE DRILLS HAVE BEEN STANDARD FOR MORE THAN 50 YEARS

Made by

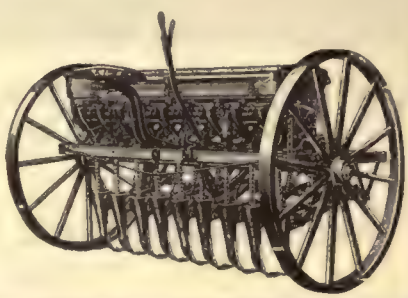
THE AMERICAN SEEDING MACHINE CO.

(Inc)

RICHMOND, IND., U. S. A.

Supplied in all Styles and Sizes.

Grass Seed Attachments May Be Added.



THE IRRIGATION AGE

VOL. XXIV CHICAGO, JULY, 1909. NO. 9

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION — THE DRAINAGE JOURNAL
THE IRRIGATION ERA — MID-WEST
ARID AMERICA — THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,
112 Dearborn Street, - - CHICAGO

Entered as second-class matter October 3, 1897, at the Postoffice at Chicago, Ill., under Act of March 3, 1879.

D. H. ANDERSON, Editor

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, $2.00. If ordered in connection with subscription, the price is $1.50.

SUBSCRIPTION PRICE.

To United States Subscribers, Postage Paid, ... $1.00
To Canada and Mexico, ... 1.50
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In forwarding remittances please do not send checks on local banks. Send either postoffice or express money order or Chicago or New York draft.

Official organ Federation of Tree Growing Clubs of America. D. H. Anderson, Secretary.

Official organ of the American Irrigation Federation. Office of the Secretary, 212 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 24 years old and is the pioneer publication of its class in the world.

Back to the Farm.

In no period of American history has there been such a reversion to the farm as now. This is particularly true of the irrigated farm. The loneliness of farm life has departed forever. The neighborhood telephone, the rural mail carrier, the trolley car, the automobile, the good roads movement have all combined to make farm life more and more attractive. Added to these are the countless improvements in farm machinery, greatly reducing the amount of human labor necessary to perform the work of the farm. Even the housekeeper has her labors lightened with the introduction of hot and cold water systems in the house and a complete sanitary installation by which the premises may be kept sweet and healthful.

The agricultural schools and experiment stations have long since begun to be effective in changing for the better the methods of farm management. The wonderful results from irrigation have been widely demonstrated. Through the agricultural press the results of experiments by scientific men have been carried to the remote corners, and if the farmer has not profited, it is because he does not read or think.

There is a wholesomeness in farm life that is not found elsewhere. There is fascination in a life among the domestic animals and the living and growing things with which the rural dweller is surrounded. The farmer of today, if fairly educated and endowed with a modicum of energy and alertness, may have more luxuries by far than the denizen of the town, and need suffer no loss of culture unless habitually he avoids contact with the many cultured people who are taking up farm life or who dwell in the towns near at hand, which depend upon the farms for their existence. The village library is for the farmer. It is one of the magnets intended to attract him to the social center. The village schools are for his children and more than ever is the tendency growing to combine farm life with village life for the benefit and pleasure of all.

The American villages are generally cleaner than they were. The disreputable elements are being eliminated and there is more and more pride in municipal decency. The family established on the farm is free from the influences that so often lead to a frivolous and purposeless life. Ordinarily the farmer knows much more of the city and town than the urban dweller does of the farm, and it is usually the farmer who has the time and money to take an occasional vacation excursion to some distant point, to gather in new ideas that lead to a larger life.

There is no occupation concerning which instruction and knowledge may be had more freely. Every neighbor is ready to help. Instruction at experimental farms and agricultural schools is without cost. More than that, the states send their lecturers into the agricultural communities to teach the people, to answer their questions and to help clear up doubtful points in farm practice and crop control. The Agricultural Department

at Washington and the State Agricultural Departments issue frequent bulletins on all sorts of farm topics and all these are free for the asking. The applicant does not even have to pay the postage. The Government even goes so far as to describe and illustrate how to build the farm ditches, gates and weirs, for the irrigating farmer. In the Twin Falls Country, Southern Idaho, where so many thousands of Eastern people have gone to make their homes, instructors are constantly going among the people giving them free assistance and advice in laying out their irrigating ditches, showing them what varieties of grain, vegetables, grasses and fruits to plant to get best results, and instructing them in the management of their farms.

Every lawmaker, whether in a state house or in the halls of Congress, realizes that the prosperity of the farmer is essential to the prosperity of the nation. Every new farm economy is a help in the maintenance of the nation's food supply. But the farmer himself occupies independent ground. He is the coddled individual. The farmer cultivates the ground and everybody cultivates the farmer. He is the one man who may skim the cream of life and have it for himself. He may select the tenderest fowl for his table. He may have the freshest eggs, fruits and vegetables for his meals and he may so operate his property that his income is as steady the year around as that of the salaried man who lives in town. The irrigated farm today is a factory whose engines do not break down or wear out, which furnishes its own raw material and whose finished product is net gain to the operator.

A Word About Publicity Campaigns.

Problems confronting the sales agent for western irrigated land cannot be solved by the reckless expenditure of money to gain publicity. Exploitation by advertising has become a potent factor in trade and to its ranks has attracted the best brains of the times. Logic, accurate deduction and resourcefulness are the principles upon which the publicity campaign is founded, and it is only through luck that success may be attained without this essential base.

Incidents to prove these assertions are not lacking. Some of the best of western lands have remained unproductive and unsought, while its owners have been vainly struggling to master the art of sales through advertising. Without recognizing the elements of human nature they have sought to attract the purchaser by extravagant prospectus or spectacular prediction. Failing in this they have turned to other, equally absurd methods, only to final discouragement and despair.

In digging into the logic of an advertising campaign it must not be forgotten that the resident in the east or the middle west is not to be led haphazard into the sale of his old home, the removal of his family to the west and the investment in lands that he has never seen. A prospective purchaser must have accumulated some means or possessions. It is but natural for him to seek confirmation of advertisements and to investigate, so far as is within his power, the integrity and responsibility of the company backing the project exciting his interest.

If there are publications in which unbiased accounts of condition may be given, the investigator usually turns to its pages. Having satisfied himself in this direction, his next step is to consult his local bankers or financial advisors. From their perusal of the various publications they are in position to give information and counsel. Upon these two agencies, the class publication and the financier, largely depends his decision as to investing.

In the many years of his newspaper work the editor of THE IRRIGATION AGE has endeavored to so edit the columns of this journal that its reputation for veracity of report and integrity of purpose could not be questioned. Wild-cat projects have gained no gild of respectability through its pages; he has refused cold cash in bulk and in driblets when disreputable promoters sought to prostitute his paper for ulterior purposes.

At this time, when prospect of a western exodus seems imminent, THE IRRIGATION AGE includes among its paid subscribers a large number of the influential banking and financial houses of the east and the middle west. It reaches monthly into public and private libraries throughout the country, and the character of the inquiry received daily through the mail is tangible evidence that its columns are read for purposes explained above.

Sales agents and irrigators should weigh these facts carefully in the preparation of their advertising and publicity campaigns. The public is cautious and prone to careful investigation. The prospective purchaser must be convinced not only that lands are valuable, but that the company promoting them is financially responsible and will complete its plans.

Geo. H. Payne.

Elsewhere in this issue will be found an article on the Scotts Bluff irrigated section of the North Platte valley in western Nebraska. Largely to one man—a man with a method—may be attributed the recent prominence to which this district has attained, and its growing popularity among home-seekers and investors. Enthusiastic, aggressive, indomitable in his work, the record of George H. Payne, President of the Payne Investment company at Omaha, deserves especial commendation.

Not in fulsome flattery or too fervent favor, it may be stated that to Mr. Payne's efforts in the field of publicity and salesmanship the West owes a debt of gratitude. Backed by a superb organization consisting of

associates in a hundred towns and cities of Nebraska and Iowa he has taken thousands of prospective purchasers into Western Nebraska and by force of logic and contact, has drawn the visitors into profitable investment and removal to the fertile tracts along the North Platte. With the possible exception of the land department of the Union Pacific, his individual efforts have accomplished more than any other agency toward the peopling of the North Platte district.

Those with whom Mr. Payne has been associated marvel at his accurate conception and tireless energy. It is only after rigid investigation that he may be induced to accept the control of sales for any district; convinced of value his first sale is to himself. Having backed his opinions with his own purse he is then prepared to interest others.

Critics declare his methods to be spectacular. To this charge he makes no denial, yet an unbroken record of quick, successful campaigns during which scores and hundreds of buyers were induced to invest after personal inspection and investigation, are proof of the keen foresight upon which he bases those methods. His thorough confidence in the worth of the lands leads to enthusiasm for their sale. His advertising campaigns are sharp, but liberal. Enthused by his energy and perseverence, his associates respond to the sudden impetus and soon a special train filled with eager buyers is whirling toward the fertile valleys where comfort and plenty may be found.

Just now Mr. Payne is completing a most gratifying campaign for the sale of Scotts Bluff land, offered by the Tri-State Land Company. Another success is about to be added to the long record. Looking to the early termination of his work in this direction, he is planning other conquests. The "man with the method" has won many laurels—but the end is not yet. A man like Mr. Payne, with his organization duplicated in various central and eastern states, would rapidly colonize all projects under the Reclamation Act.

Eastern Wage-earners Looking Westward.

Much as may be the regret of both the wage-earner and the employer at the financial stringency of the past two years, there are, nevertheless, some educational and beneficial results to be gained therefrom. Deep in the minds of the employes in many large eastern cities and villages there is a nucleus of thought that may easily be turned to the advantage of the great west.

Regardless of whether the hard times resulted from the national election, the tariff revision, or the disposition of certain legislatures to unnecessarily oppose and impede the progress of railroading, the wage earning public has been taught a sound lesson. Their pay envelopes have been woefully depleted and many have entirely disappeared for long intervals. The condition induced deep thought.

To be independent of this irresponsible pay check is a consummation devoutly wished for. Holding no hope for future affluence, it has suddenly failed of temporary support. There is but one solution for the puzzle—it must give place to more substantial and dependable income.

Toward the mountains, the sparkling waters and the pure air of the west, an exhausted, discontented east has turned its head. Behind lies drudgery, helplessness, an old age of want. Bound by the weight of toil, it leans upon its wage staff and peers into the future—and the west. Its home ties are deep rooted, yet its love of home and comfort bends its ear to the glorious promise of independence and plenty in view of the snow caps of the Rockies and Sierras.

Does the west hear? Has it been so busy with the normal pulsations of its progress that it is heedless of the opportunity?

Never before in the history of irrigation activities of the west have conditions been more auspicious. The east is made restless by the failure of its Saturday night income. Its people, made cautious by late experience, are now saving. Records of small bank deposits show heavy gains. Soon there will have been accumulated sums sufficient for investment. Shall these monies turn into the coffers of the stock brokers, the wily mine promoters or the watered stock of the giant corporations? Or, will it carry its owners into the smiling, bountiful valleys where earth wooes sky and man is man?

The answer will be given within the next year or two.

TO OUST WYOMING CENTRAL.

Governor of Wyoming Plans Firm Action Against Irrigation Company.

On the grounds that in the past it has taken no adequate steps toward the development of the project for which it was licensed, and that its presence is a bar to the proper reclamation and settlement of the district, Gov. Brooks, of Cheyenne, is said to be preparing to take drastic measures to cancel the state rights granted to the Wyoming Central Irrigation Company.

In his note of protest to Joy Morton, of Chicago, president of the company, Gov. Brooks is reported to have pointed to the fact that little progress has been made in the work, despite the elapse of time, and that the force of employes now employed is inadequate for the completion of the project within a reasonable period.

Newspapers in Cheyenne assail the company on the ground that it is a promoters' project, and declare that its officers have conspired to exempt the land from use by settlers. The rights now held by the company embrace about 200,000 acres of the ceded portion of the Wind River Indian reservation.

GRAND JUNCTION EXTENSION CANAL.

Private capital organized into what is known as the Marrs High Line Extension Canal is said to have filed plats at Grand Junction, Col., for the construction of a canal 100 miles in length in a westerly direction from the lower end of the government canal in this district.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

"SPRAYING FOR WEEDS."

How Science Destroys "Undesirable Plants" and Allows the Grain to Remain in Better Health Than Ever.

Fifteen years ago had you told the average farmer that by going over his grain fields with a spraying machine he could eliminate practically every weed with which they were infested and leave the growing grain benefited and unhurt, he probably would have told you what he thought of you, and had you persisted, he might have used bodily effort to enforce his opinion.

But this very day that same farmer is probably sitting placidly on the seat of a modern traction sprayer, giving his cereal fields a thorough drenching of weed-killing substance that causes the weeds to turn black and then wither away—but leaving the grain unscathed.

How did this transition come about? Like all great discoveries—very simply.

In 1896, Prof. H. L. Bolley of the North Dakota Agricultural Experiment Station, Fargo, North Dakota, decided to make a definite effort to test whether it would be possible to kill young weeds, especially young mustard plants, in growing wheat, by means of chemicals sprayed over the weeds and grain, without killing them both in so doing. He had long considered such a proposition as very feasible, but of course required some time to get what he considered the proper proportions of spraying mixture before making the first trial. However, he made the attempt in 1896 with solutions of copper sulphate and mercuric bichloride and met with surprisingly successful results, plainly demonstrating that he was upon the right track. So to our own United States belongs the credit for this discovery, although French investigators were working along the same lines at nearly the same time. In 1897-8 other exhaustive experiments were undertaken, and very shortly it was firmly established that such work could be practised with a high degree of success by any farmer. Since that time, experiments have been steadily pursued along this line and the fact remains that certain weeds can be entirely eliminated without destruction to the grain growing beside them.

The success of the entire project lies in the simple fact that the leaves of nearly all farm weeds are broad and somewhat rough and soft, while on the other hand, the growing grain plant is slender of stalk and leaf, and presents a smaller and smoother surface. When the liquid is sprayed forth from the machine, the broad and porous leaved weed catches and absorbs a sufficient quantity of the chemical to insure its death, while from the slender grain plant, the liquid runs off without doing any damage. After spraying, the tops of the entire sprayed tract will turn black, but in two or three days the grain plants will have regained their natural color and original strength, while the weeds are withered and dead.

Sulphate of iron has largely succeeded copper sulphate because of the cheapness of the former, and many tons of it are now being used in this anti-weed campaign. The spraying should be done when both the grain and the weeds are young, about the time the grain is four to eight inches high, although some later experiments by Professor Bolley indicate that the work can be carried on when the grain is older. The more rapid the growth of the weed, the more susceptible it is to the effect of the spraying mixture, and the more thoroughly the work can be done.

There are, of course, some weeds that cannot be affected without injury to the grain, but the most prevalent of the "vagrant" weeds, such as false flax, worm seed mustard, tumbling mustard, common wild mustard, shepherd's purse, pepper grass, ball mustard, corn cockle, chickweed, dandelion, Canada thistle, bindweed, plantain, rough pigweed, kinghead, Red river weed, rag weed and cocklebur, can all be controlled, and in nearly every case, entirely eradicated, by careful and systematic spraying.

It is not the writer's intention to make this a conclusive article, but rather to stimulate interest in what is undoubtedly one of the greatest boons to the farmer that has yet been discovered. And especially is this so, where there are large tracts of land, and heretofore not sufficient help to thoroughly work them.

Where the field is large and uniformly infested with weeds, a traction sprayer that will generate enough pressure to throw a fine, powerful mist through Deming Bordeaux nozzles, makes the most satisfactory outfit, but where the weeds grow in patches, a small cart sprayer like the one in the illustration, will give very satisfactory results. Nearly any spray pump manufacturer can give very complete information about spray pumps for this purpose.

Professor Bolley has issued from time to time bulletins on weed spraying, which contain valuable information and give details of the entire operation, also many other points relating to weeds. Copies of these bulletins are sent free to anyone on request.

Spray Pump Made by The Deming Co., Salem, Ohio.

The same principle mentioned before in this article, can be made use of in ridding dandelions from our lawns, viz., by using sulphate of iron in proportions of about two pounds to the gallon of water.

There is nothing miraculous at all in this method of weed eradication. It is simply an application of common sense, and after we give it a little sober investigation, we wonder why it wasn't thought of before—"It seems so simple"—which expression, by the way, is practically the same one we always use after another's mind has brought forth some new development for the benefit of the human race.

While, of course, such a method of destroying weeds cannot replace the approved methods of eradication by cultivation, seed cleaning, crop rotation, manure composting, proper pasturing and vigilant hand work, still, the writer feels safe in asserting that the financial gain to the country at large from this discovery will be greater than that afforded by any other single scientific investigation applied to the process of agriculture, as soon as the farming public makes it a regular practise.

Pueblo and the Arkansas Valley

As a Place to Locate or as a Section in Which to Invest.

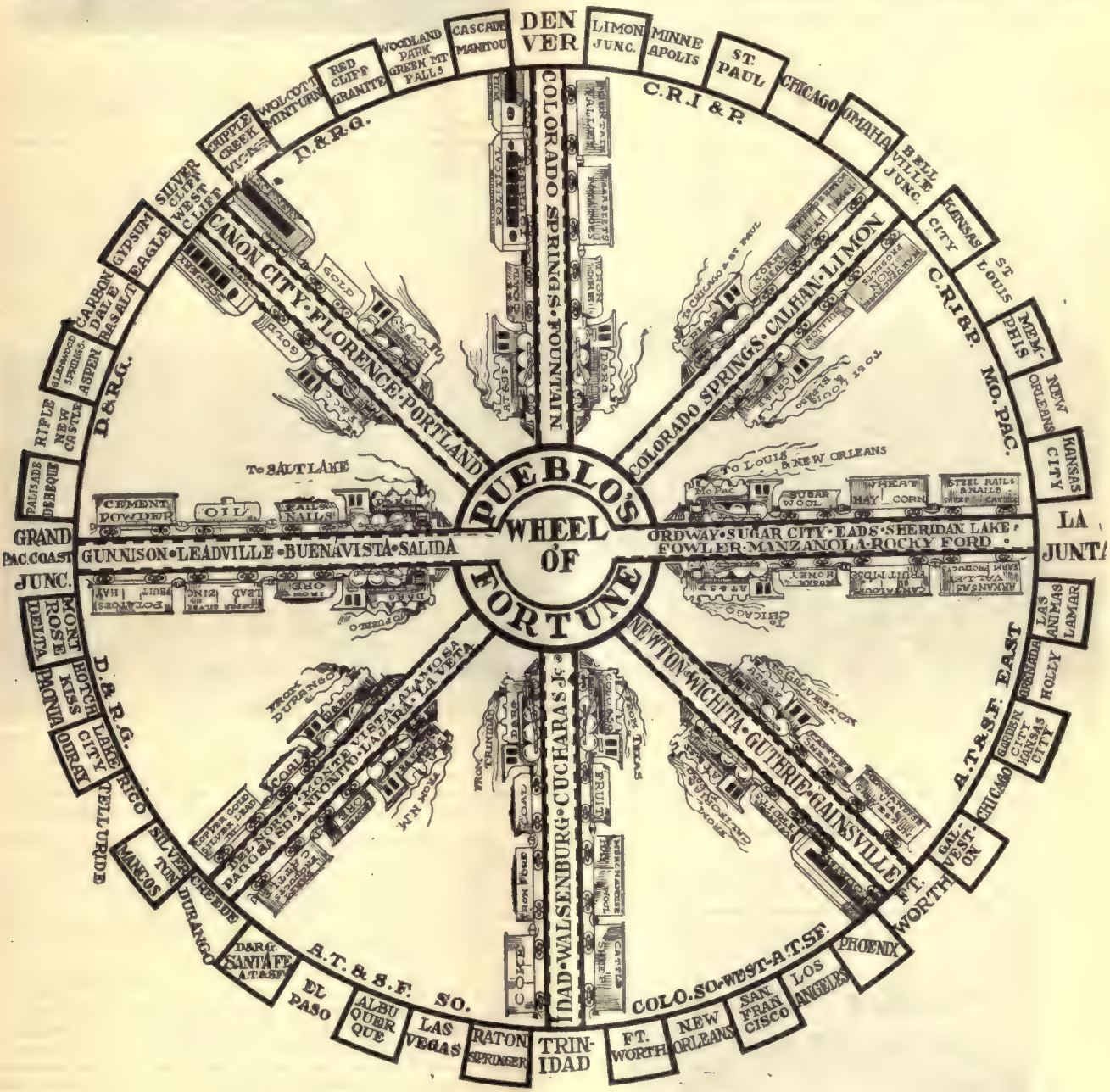
A great commercial and manufacturing city of the Rocky Mountain Region; a great railroad, steel and iron center; a great jobbing metropolis; finest climate in America.

By E. W. PALMER

To trace the development of cities and follow their lines of growth is always an interesting study. That a city has been founded, grows, fosters certain lines of industry and development, is usually because of clearly defined reasons. Men do not build cities in certain localities by chance, but because the results obtained for their labors there are greater than are apparent elsewhere in the territory tributary .

The growth and development of Pueblo into a great industrial city has been the natural and logical sequence of her location, her topography, climate and multifarious and rich gifts nature has bestowed upon the broad stretches of plain, mountain and valley which surround her.

Pueblo is the natural meeting point of the East and West. Situated as she is at the point on the Arkansas river where valley and mountain meet, she commands not only the fertile lands of the Arkansas valley, "the richest valley in the world," but receives the trade and resources of the great mountain region to the west through the only gateway to it, the Royal



Pueblo's Wheel of Fortune.

Gorge. On the south she commands the rich coal fields of southern Colorado and the trade of Mexico and Arizona. To the north the iron deposits of Wyoming come to her in great trainloads drawn by the magnetic touch of Pueblo coal, clay, limestone, abundant labor, and unexcelled facilities of distribution. Through her great railroads Pueblo distributes to all the West from the Mississippi river to the Pacific coast.

Industrial Pueblo.

Pueblo is a great manufacturing city. Her manufactories sprang into being because of man's necessity and because Pueblo was the one city in the West that could best supply that necessity. She is the only great iron and steel city yet developed west of the Mississippi river. The smoke of her great mills and the glow of her fiery furnaces never cease.

Her great steel plant, the Minnequa plant of the Colorado Fuel and Iron Company, cost forty millions of dollars, employs over five thousand men, and its output of steel rails, pig iron, nails, barbed wire, water pipe and other products supplies the wants of half a continent. This steel plant attracts trains of iron ore from Wyoming, Utah and Colorado,

Cozy Corner, Mineral Palace Park, Pueblo.

coal and coke from Colorado and clay and limestone from the local quarries. In mine and forest over a great area an army of men are toiling to supply coal, coke, iron ore, and by-products for the roaring furnaces of this mighty industrial giant. The plant consumes thousands of cars of raw material and its output is over $22,000,000 of finished annual product, almost half a million dollars a week.

But Pueblo is not merely a steel city. She is a great smelter city. To Pueblo come the ores from Cripple Creek,

Mineral Palace, Pueblo.

Creede, Leadville, Aspen, the Coeur d'Alene district in Idaho, and the hundreds of smaller camps in the Rocky Mountain region. While the smelting industry has declined all over the West due to many causes, Pueblo maintains two great smelters in constant operation, one of them, the zinc smelter, being the largest of its kind in the United States. The smelters employ over a thousand men and the output in gold, silver, copper, lead and zinc approximates $8,000,000.

Sugar Beet Field Near Pueblo.

The same generous mother nature which made possible these great industries, has made possible other and lesser industries. Pueblo has three brick plants, one of them the Standard Fire Brick Company, being the largest of the kind in the West, manufacturing all kinds of brick, tile, sewer pipe, crucibles, pottery, etc. Pueblo brick plants employ more than six hundred men.

Pueblo has eighty-five other industries; three saddle and harness factories employ 100 men and output $400,000 worth of goods; several candy factories produce $225,000 in finished goods. There are five other iron plants manufacturing stoves, mining machinery, railroad supplies and general foundry work. One tent and awning plant; one artificial limb factory, two baking powder and extract factories, one dynamite plant; a number of big printing and publishing houses; five bottling plants, one brewery, two wholesale bakeries, four steam laundries, a broom factory, two mattress factories; a canning company; two creameries; one farm implement factory; one engraving plant, one electro-plating plant; two macaroni factories; two packing companies, employing one hundred and fifty men and outputting a million

A Pueblo Home.

dollars; three planing mills; railroad repair shops of five railroads, employing more than five hundred men; a rug factory; two steam dye and cleaning plants; two trunk factories and many others. Pueblo factories output more than $40,000,000, a greater sum than the entire manufacturing output of many states.

While manufacturing has gained great headway in Pueblo her jobbing trade has not been retarded. Pueblo has thirty-five jobbing houses and keeps 200 salesmen on the road constantly. In wholesale groceries her territory is her own exclusively, covering all southern Colorado, fifty salesmen alone selling groceries from this city. In some lines of jobbing Pueblo trade extends from the Republic of Mexico to the Canada line, with an ever-expanding output.

Pueblo Railroads.

By reason of her industrial supremacy, Pueblo is a fine field for the railroads of which she has five great trunk lines. No other city of like size in America handles during the year so much freight and passenger business as Pueblo. Her annual freight bill to the railroads amounts to more than $12,000,000 and more than 1,500,000 cars each year are handled in her freight yards. On one single track south from Pueblo more business is done than on the North-Western between Chicago and Milwaukee, some days more than eighty trains passing over this one line. There are more daily passenger trains between Pueblo and Denver than between New York and New Haven. More than 16,000 passenger cars enter and leave the Union Depot each month.

In addition a new electric line is building from Canon City to Dodge City, Kan., a distance of four hundred miles, with headquarters at Pueblo, thus making Pueblo a great retail market.

Pueblo—The Financial City—Her Banks.

Few cities of equal size have as many strong banks and financial institutions as Pueblo. The city has seven banks, all of them growing and increasing in business. The reason for their growth is no secret. An immense amount of business is transacted in the ambitious and expanding city at the junction of the Arkansas and the Fountain. The banks of the city are the natural clearing houses for the handling of this business.

As an index of the greatness of Pueblo and the importance of her banking institutions about one-tenth of all the bank deposits in Colorado are in the vaults of this city. In addition a great chain of banks are tributary to the banks of Pueblo, capital from this city controlling banks in Denver, Florence, Trinidad, Lamar, Silverton, Durango, Ouray and a score of other cities in Colorado. The total deposits in the banks approximate $12,000,000, besides deposits in building and loan associations and similar institutions. Capital from Pueblo finances cattle, land, irrigation, mining, manufacturing enterprises all over Colorado and the West.

Alfalfa Field Near Pueblo.

Aside from the great steel and iron interests, the smelters

Lake Minnequa, Near Pueblo.

and other great industrial plants that have made the city famous, Pueblo has an agricultural region of unparalleled fertility. Irrigation is the magician's wand that has changed and is changing a desert to a garden. The productiveness of land under irrigation in this dry climate with 75 per cent of possible sunshine almost surpasses belief. Lands that a few years ago were worth from $2 to $10 per acre now with good water rights, sell for from $75 to $250 per acre. In the valley of the Arkansas, cantaloupes and melons have brought as high as $260 per acre net. Sugar beets have given returns of $40 to $200 per acre, the average being $75 per acre. Similar returns on alfalfa, fruits and other crops are frequent in conformity with their market value. The great industrial

A tremendous impulse in farming is under way all over southern Colorado. Thousands of settlers from the East are pouring in and lands a few years ago considered dry and barren are being brought under cultivation by irrigation from reservoirs, by the Campbell system of dry farming, or by pumping the underflow. The year 1906 saw the great majority of government land in the valley taken by settlers, although there is some yet open. Dry lands have practically doubled in value the past year.

In the valley of the Arkansas is the home of the sugar beet and the famous Rocky Ford cantaloupe. Seven sugar factories are already in operation. The estimate of money paid the farmers of the valley for sugar beets in 1906 was

Central High School, Pueblo.

population of Pueblo and the adjacent great mining camps furnish a constant market for the product of the valley, the demand, in many instances, being greater than the supply. Large tracts near Rocky Ford have recently been devoted to raising garden seeds for the Eastern seed men with most gratifying results. Aside from the Arkansas valley, to the west and directly tributary to Pueblo are the famous Grand Valley and the Valley of Gunnison. The Grand Valley is the famous fruit producer in the West and the product is unexcelled. A fair output of peaches is $300 per acre. A peach farm begins producing at the end of the third year of growth. The Gunnison Valley is also famous and produces fruit and live stock, while the adjacent mountains are rich in coal and precious metals. To the southwest is the famous San Juan, with its rich mines, and farther east is the famous San Luis, with its great wheat farms, its fruit, and live stock, all of which find in Pueblo the nearest and best market.

Union Depot, Pueblo.

$3,000,000, for cantaloupes $300,000. According to the report of the State Bureau of Mines for 1905 the total output of the precious metals in Colorado was as follows:

Gold	$25,577,946.81
Silver	7,743,718.51
Lead	5,438,506.67
Copper	1,636,266.04
Zinc	4,774,497.91
Total	$45,070,935.94

Returns from Agriculture.

Hay	$16,000,000
Sugar beets	7,500,000
Dairy	10,000,000
Fruit	10,000,000
Potatoes	4,000,000
Wheat	4,500,000
Vegetables	3,000,000
Oats	1,000,000
Corn	1,000,000
Peas	1,500,000
Barley	300,000
Rye	30,000
Total	$58,830,000

Colorado's fame extends universally by reason of its wonderful stores of precious metals, yet the value of the state's agricultural products annually exceeds the mineral output. Between 1890 and 1900 Colorado advanced to the front place of irrigated states, and the farmers with water at hand for irrigating purposes made rapid progress, failure of crops under existing conditions being unknown, quality and quantity per acre surpassing all records elsewhere. The areas capable of being watered becoming limited through occupancy, attention recently has been devoted to the so-called dry lands, and the dry system of farming has been experimented scientifically on a large scale, with most satisfying results. Probably no state in the Union yields a greater return, in proportion to time and labor expended. The net acreage being greater and more valuable than elsewhere. Colorado apple orchards annually net a profit from $200 to $300 (per acre) in same period. Lands of this character rated five years ago

at $50 per acre, now command $1,000 to $1,200 and upward per acre.

The vast areas of non-irrigated land particularly in the eastern third of the state will produce large crops under eastern third of the state will produce large crops under modern methods of treating the soil now in vogue. The State Agricultural College is experimenting with various types of cereals with a view of selecting varieties peculiarly adapted to the soil in non-irrigated districts. The United States Department of Agriculture has established experimental stations, and with the co-operation of railroad companies and private individuals is solving the problem of dry farming, and results so far attained are most favorable.

To tell all Pueblo's industrial features would needlessly extend this article. In the last few years Pueblo has made many notable improvements. All the business section has been

Entrance to City Park, Pueblo.

A Pueblo Home.

Crews-Beggs Dry Goods Co., Pueblo.

recently paved and curbed at a cost of almost a million dollars. Storm and sanitary sewers have been constructed, and several hundred miles of cement walks laid. Her park system is the pride of the city, comprises twelve parks with an area of three hundred and fifty acres. Two of these parks are really notable. Mineral Palace Park, with its beautiful

North Main Street, Pueblo.

Lake Clara and splendid Mineral Palace, with a great collection of Colorado minerals, and City Park, which has the finest collection of trees in the West. In addition, Pueblo has beautiful Lake Minnequa, with club house and theater and all the details of a popular summer outing park for the people of the city.

Material resources, factories, homes, banks and railroads, are not the full measure of a city or a people. A city may possess all these and yet be base and unworthy. What showing can Pueblo make of the things that minister to man's higher nature, such as schools, churches, colleges, hospitals, clubs, music, libraries? These more truly measure a city. Pueblo has fifty-four churches and organizations representing all denominations, three great hospitals, three children's homes, an organization of associated charities, and many lesser organizations to aid the weak and unfortunate. The public schools of Pueblo justly occupy a high rank. Without exaggeration they can truly be said to equal the best in the United States. There iare twenty-four public school buildings, including two splendid high schools, with 800 students. In the public schools are enrolled about 8,000 pupils. Pueblo has one college, two commercial schools, three schools of music and art, and several academies. Pueblo is the home of the Colorado State Fair, now grown to be a great state institution with ample buildings and grounds.

Among her notable public buildings is her Grand Opera, one of the finest in the country, erected at a cost of $350,000; a fine public library, costing $100,00, with 25,000 volumes; the Federal building, an impressive structure of gray brick; a new court house is under construction at a cost of $400,000. The great group of buildings of the State Insane Asylum is in a beautiful park in the western part of the city. The Mineral Palace, a pure white building of noble architecture, cost $250,000, and contains the best display of Colorado minerals in the state.

(Continued on page 353.)

Five Thousand Delegates to Spokane Congress.

Nearly Every State to Be Largely Represented—Canada Will Send Officials—List of Speakers Includes Many Notables—Program Is Announced.

Bankers, railroad presidents, scientists, experts on reclamation of arid and swamp lands, deep waterways, forestry, good roads and homebuilding have places on the programs in preparation for the National Irrigation Congress, at its sessions in Spokane, August 9 to 14. R. Insinger, chairman of the board of control says there will be from 4,500 to 5,000 accredited delegates from various parts of the United States and representatives from Canada, Europe, the South American republics, China and Japan. It is expected also that President Taft and several members of his cabinet will be in attendance.

Chief executives of 25 states and territories are to be present on Governors' day, August 13, when Governor Hay of Washington will preside at a joint meeting of the governors and congressional representatives of the western states to discuss ways and means of obtaining national and state legislation to encourage the developement of the country anl conserve its national resources.

There will be elaborate electrical illuminations in the principal thoroughfares, where stacked crops of the districts tributary to Spokane will be displayed in massed exhibits.

The feature of the opening of the congress will be the raising of hundreds of flags to the tops of as many 40 foot poles in the residential districts and the unfurling of the flags of the nations and banners in the business sections the morning of August 9, when massed musicians, headed by the Third Regiment United States Infantry band, will play patriotic airs. This will be followed by the irrigation ode, sung by a large chorus of trained singers, and state hymns by school children. There will also be receptions, banquets, theater parties and several excursions.

Mr. Insinger feels assured of large delegations from Kansas, New Mexico, Texas, Utah, Colorado, the Dakotas, Wyoming, Montana, Nebraska, Arizona, Nevada, California, Oregon, Idaho and Washington. Canada will send delegations and there will be representatives from eastern and middle western and southern states, where the people are interested chiefly in forestry, deep waterways, good roads, reclamation of swamp land and home-building.

"We have been assured the hearty co-operation and assistance of the forestry and reclamation services, as well as the department of agriculture itself," Mr. Insinger said, "and with the natural activity of the people in the Northwest and in other parts of the country, where irrigation is profitably and successfully practiced, we expect to make a congress which shall eclipse anything yet attempted by the association."

The Spokane chamber of commerce has received advices that the Chicago Association of Commerce will send its "boosters" in a special train to capture the 1910 congress. Pueblo, Colo., which has a claim by reason of stepping aside for Spokane at Aubuquerque, N. M., last fall, will leave nothing undone to land the meeting for its city, and it is announced that the business men's association there will send two special trains. The people of Charleston, S. C., believe that more benefits would result by having the meeting in the South in 1910 than by keeping it in the West, where irrigation is practised extensively and is well known, and will have the support of the southern states in their efforts to secure the eighteenth session.

The national officers of the congress for 1909 are: President, George E. Barstow, Barstow, Texas; first vice-president, H. D. Loveland, San Francisco; second vice-president, R. E. Twitchell, Las Vegas, N. M.; third vice-president, I. D. O'Donnell, Billings, Mont.; secretary, B. A. Fowler, Phoenix, Ariz.; assistant secretary, F. H. Griswold, Chicago; foreign secretary, Rev. Dr. E. McQueen Gray, Carlsbad, N. M.

The official program for the congress is as follows:

Opening Day, Monday Morning, August 9.

Music—14th U. S. Cavalry band, Fort Walla Walla, Wash.
Call to Order—R. Insinger, chairman board of control.
Invocation—Rev. Dr. Wm. Hindley, pastor Pilgrim Congregational Church.
Music—"The Star Spangled Banner," 14th U. S. Cavalry band.
Introduction of George Eames Barstow of Texas, president of the new Congress.
"The Irrigation Ode," Spokane Choral Society, 350 voices.
Welcome to the State—Governor Hay of Washington.
Welcome to the City—Mayor Pratt of Spokane.
Response on behalf of the National Irrigation Congress, George E. Barstow, president.
Responses on behalf of governors of states, representatives of foreign nations and insular possessions.

Monday Afternoon, August 9.

Address—James J. Hill, chairman of the board of directors Great Northern Railway Company.
Address—"Irrigation by Private Enterprises," Dr. George C. Pardee, ex-governor of California.
Address—"The National Irrigation Situation," F. H. Newell, director U. S. Reclamation Service.
Address—Joseph M. Carey, Cheyenne, Wyo.
Address—"The Irrigation Situation in the State of Washington," Dr. Enoch A. Bryan, president of the Washington State College.
Address—Representative of the General Federation of Women's Clubs.

Monday Evening, August 9.

The board of control, assisted by ladies of Spokane, will tender a reception to the officers and delegates of the National Irrigation Congress, the governors of states, representatives of foreign nations and other guests at the Masonic Temple. The occasion will be marked by relaxation and good fellowship; it will be informal. The 14th U. S. Cavalry band will be in attendance in the reception room and there will be an orchestra in the ball room.

Tuesday Morning, August 10.

Forestry Day.

Address—"Home Building for the Race," Gifford Pinchot, U. S. Forester.
Address—"The Forests of Canada and Their Relation to the Water Supply," R. E. Campbell, forestry branch Department of the Interior, Canada.
Address—"The Attitude of the Lumbermen Toward Forestry," George S. Long.
Address—"Reforestation," E. T. Allen, U. S. District Forester.
Address—"The Relation of Forests to Water Flow," Bailey Willis, U. S. Geological Survey.

Tuesday Afternoon, August 10.

Water As a Resource.

Address—John Barrett, director of International Bureau of American Republics.
Address—U. S. Senator Albert B. Cummins of Iowa.
Address—"Deep Waterways," Thomas S. Waring, editor The Evening Post, Charleston, S. C.
Address—Dr. W. J. McGee, secretary of the Inland Waterways Commission.
Address—"Deep Waterways for the Pacific Coast," J. N. Teal, Joint Conservation Committee.
Address—N. W. Harris, Chicago.

August 10—Afternoon.

Parade of progress, showing the transformation of the Northwest from semi-savagery to civilization, by a series of district floats and mounted men and marchers.

Tuesday Evening, August 10.
Good Roads.

Address—Samuel Hill, president of the Washington State Good Roads Association.
Address—Samuel Lancaster, highway expert, illustrated by stereopticon views.
Banquet.

Wednesday Morning, August 11.
The Congress and Its Work.

Address—Hon. Richard A. Ballinger, Secretary of the Interior.
Address—"The Conquest of the Wilderness," U. S. Senator Francis G. Newlands of Nevada.
Address—Howard Elliott, president of the Northern Pacific Railway Company.
Address—"Ultimate Ideals," George H. Maxwell of Chicago.
Address—"The Message of the West to the East," F. H. Griswold of Chicago, assistant secretary seventeenth National Irrigation Congress.
Address—"What Has Become of the Great American Desert?" Charles W. Mott, general emigration agent of the Northern Pacific Railway Company.

Wednesday Afternoon, August 11.
Legislation.

Address—Congressman William A. Reeder of Kansas.
Address—"The Development of Idaho under the Carey Act," F. R. Gooding, ex-governor of Idaho.

Thursday Afternoon, August 12.
Reclamation—Irrigation.

Address—U. S. Senator Wesley L. Jones of Washington.
Address—"Irrigation from the National Point of View," U. S. Senator Thomas Carter of Montana.
Address—"Pumping for Irrigation," R. H. Thompson, city engineer, Seattle.
Address—"Irrigation and Irrigation Development in Canada," J. S. Dennis, assistant to second vice-president Canadian Pacific Railway Company.
Address—Hon. John L. Wilson, former United States Senator from Washington.
Parade and countermarch of the industrial and irrigation army, with 10,000 uniformed men in line. The official emblem of the Congress, showing science bidding the desert drink, will be featured on an elaborate float.

Thursday Evening, August 12.
Home Building.

Stereopticon Lecture—C. J. Blanchard, statistician U. S. Reclamation Service.
Address—"The United Pacific States," Rufus P. Jennings, chairman of the California promotion committee.
Banquets.

Friday Morning, August 13.
Deep Waterways.

Address—"General Purposes of the Irrigation Congress," U. S. Senator Weldon B. Heyburn of Idaho.
Address—Hon. Joseph E. Ransdall of Louisiana, U. S. House of Representatives, president National Rivers and Harbors Congress.
Address—W. K. Kavanaugh, president of the Lakes-to-Gulf Deep Waterways Association.

One of the Substantial Structures at the Alaska-Yukon-Pacific Exposition.

Address—"Some Fundamental Principles of the Irrigation Law," Clarence Johnston, state engineer of Wyoming.
Address—Samuel H. Lea, state engineer of South Dakota.
Address—John H. Lewis, state engineer of Oregon.
Address—"Fundamental Principles Underlying Water Rights," Morris Bien, U. S. Reclamation Service.

Wednesday Evening, August 11.

Illuminated parade of progress, representing various periods in the Northwest, from 1805 to 1909. Indians from reservations and districts in the Pacific and western states will join in the demonstration.

Thursday Morning, August 12.
Soil Utilization.

Address—Hon. James Wilson, Secretary of Agriculture.
Address—"Apples and Alfalfa," Hon. Alva Adams, ex-governor of Colorado.
Address—"Scope and Purpose of the Irrigation Investigations of the U. S. Office of Experiment Stations," Dr. A. C. True, director of the office of experiment stations.
Address—"The Proper Use of Water," Prof. Samuel Fortier, chief of irrigation investigations, U. S. Department of Agriculture.
Address—"Irrigation in Washington," O. L. Waller, irrigation expert U. S. Department of Agriculture.
Address—"Home-Building as Encouraged by Dry Farming," representative of the Dry Farming Congress.
Address—"Deep Waterways for the Inland Empire," Prof. W. D. Lyman, Whitman College.
Address—"Drainage as a National Problem," U. S. Senator Moses E. Clapp of Minnesota.

Friday Afternoon, August 13.
Governor's Day.

Address—Governor Hay of Washington.
Address—Governor Brady of Idaho.
Address—Governor Johnson of Minnesota.
Address—Governor Gilchrist of Florida.

Saturday Morning, August 14.
President's Day.

Address—His Excellency the President.
Address—"Conservation," E. H. Libby, president of the Washington Conservation Association.
Address—P. S. Senator J. M. Dixon of Montana.

Saturday Afternoon, August 14.
Business Meeting.

Report of committee on permanent organization.
Election of officers.
Selection of next place of meeting.
Adjournment.

NORTHWESTERN ENGINEERING CORPORATION.

Civil Engineers, Headed by Walter H. Graves, Form Company for Special Practice.

We are pleased to note that Mr. Walter H. Graves, the well-known civil engineer, and who has been prominently identified with the irrigation development of the West for the past thirty years, is now at the head of a thriving and successful engineering and construction company, known as the Northwestern Engineering Corporation, located at Portland, Ore., Seattle and Spokane, Wash.

Mr. Walter H. Graves, Mem. Am. Soc. C. E.

It seems from the circular letter issued by this institution that it is an association of civil engineers who are engaged in the various lines of special engineering practice, such as irrigation, hydraulic power development, electric, reinforced concrete, municipal railroads, bridges and buildings, etc., and who have pooled their professional specialties in one business organization in the belief that they can secure better results, not only for themselves, but for their clients as well, "by co-operative and co-ordinated effort" and at the same time have the advantage of "mutual assistance and consultation."

This idea is rather unique in the line of professional practice but, as "combination" is the keynote of modern business methods, we do not see why it can not be made to work out successfully in professional lines as it has in the industrial field.

Mr. Graves, the president of this corporation, is widely and favorably known as one of the leading irrigation engineers of this country. He has been actively engaged in the construction of irrigation works throughout the various sections of the western country for many years and he states that during that time he has located and constructed more than four thousand miles of irrigation canals and that there are over one hundred thousand people living on and supported by the lands reclaimed by the irrigation works that he has constructed,—a claim which he makes with much pardonable pride.

Mr. Graves was a member of the famous Powell Expedition in the early exploration and survey of the Colorado river and its canyons and was subsequently employed by the government in connection with the topographical work of the Geological Survey and in collecting information relative to the irrigable lands and available water supplies throughout the West. He has collected much of the data for the Government Report on "The Arid Lands of the United States" issued in 1878.

During these investigations he became very much interested in the subject of reclaiming these arid lands and foresaw that irrigation was destined to become a business of paramount importance in the West. With the idea of properly qualifying himself for engaging in it he made Irrigation Engineering a special study and in the Spring of 1879 resigned his position at Washington to locate at Denver, Colo., placing on his office door the sign, "Irrigation Engineer." Mr. Graves states now that he feels confident that this was the first sign of this kind ever displayed in this country and he now has the same sign in his office at Portland.

The period between 1879 and 1892 was one of great activity in the settlement and development of the West and especially throughout the intermountain states. It was during this period that most of the great irrigation systems that have contributed so largely to the prosperity and wealth of these states were projected and successfully carried out.

Among the pioneers in the field of irrigation Mr. Graves was one of the most active and progressive in instituting and promoting projects of greater magnitude than had before been considered practicable. In working out and constructing these great systems under the conditions that then prevailed he had to meet and solve many problems incident to a comparatively new field of engineering practice and thus set a pace and established precedents that are now generally accepted as standard among irrigators.

In 1879, in association with Ex-Governor John L. Routt and Senator John S. Stanger, editor and proprietor of the *Colorado Farmer,* he planned and constructed the Empire Canal, the first of the great canal systems of the San Luis Valley in southern Colorado and northern New Mexico. Later in association with Mr. T. C. Henry, he instituted and constructed the Citizens and Rio Grande canal systems. The combined San Luis Valley canal systems supply with water more than 500,000 acres of land, cost approximately $2,500,000, and furnish homes for at least 30,000 people.

Mr. Graves also designed and constructed the Uncompahgre Canal, in the western part of Colorado, which was recently purchased by the Government in connection with the "Gunnison Tunnel Project," and the canals about Grand Junction which has made the Grand River valley famous as one of the "garden spots" of the world. He also constructed some of the large canal systems in the northern and eastern parts of the state and in the surrounding states, Wyoming, Montana, Idaho, Utah, and also in New Mexico and Arizona. He estimates the aggregate cost of the various irrigation works which he has designed and of which he has had supervision to be approximately $11,560,000.

The Leadville mining excitement in 1878 and 1879 brought a great many people to Colorado and this was really the beginning of the tide of immigration that followed and spread over the entire inter-mountain region and was the occasion of the great reclamation development that took place during the succeeding years. The desirable and available areas for settlement were soon appropriated and the hungry land-seekers began to look longingly towards the great Indian Reservations, insisting that these lands should be either alloted and utilized by the Indians or thrown open to settlement. In response to these demands the Government through the Interior Department instituted a policy of alloting the reservation lands to the Indians in severalty and purchasing the unallotted portions and releasing them for settlement. In carrying out this policy it became necessary to provide irrigation for those lands allotted to Indians, where agriculture was impracticable without it, and the department undertook to construct the necessary irrigation works in furtherance of this policy.

The construction of these irrigation works was generally entrusted to some one entirely unfamiliar with the requirements of the business or some engineer from the East who had more political influence than experience and regarded his position as a sinecure. In consequence after several years of failure and the useless expenditure of a large sum of money the policy was about to be abandoned when the matter was brought to the especial attention of the Hon. John W. Noble,

(Continued on page 351.)

The Land of Taos

A Garden Spot in New Mexico Where Great Development Will Take Place Within a Few Years.

The Editor of THE IRRIGATION AGE recently made a trip through southern Colorado and northern New Mexico, and after reaching the southern state line of Colorado concluded to pay a visit to that far-famed country, the Taos Valley, lying along the canyon of the Rio Grande, and fed by numerous strongly-flowing streams, rising in the ranges to the east and south.

Surrounded on the south and east by lofty mountains, flanked on the north by low foot hills and skirting on the west the magnificent canon of the Rio Grande, the Taos Valley of New Mexico nods to an ancient race, a forgotten civilization and, offering up its wealth of soil and its immutable panorama of scenery, beckons eagerly to the approaching vanguard of a new people, new industry, new life and new activity.

Long before a certain daring Italian braved the danger of counsel and tradition to sail westward and plant the Spanish flag upon the shores of a new continent, the Taos valley, peaceful and productive, sustained a red-skinned race. Skilled in the arts of peace, home-loving, industrious, its people reared unto themselves monuments that shall last forever. The Pueblos of the Taos form the curious, puzzling links between the long past and the present, and by their grim solitude awaken the speculation and wonder of a new race.

Ever was the Taos a valley of fulfilled promise. With the primitive implements in their employ, the ancient dwellers might only scar the surface, yet bountiful harvests succeeded each planting. So copiously had nature supplied the soil with plant foods that generation after generation lived bountifully by occasionally turning surface soil.

Four inch plow shares were unknown, rotation of crops was never practised, science had never aided the soil-tillers with a treatise on weed-killing or plant culture, fertilizers were never applied, yet even as far back as the legends and traditions of the race extend, the valley was known as the storehouse of old New Mexico, the west and southwest. Old ditches and their laughing waters tell the plain story of the years, but the mighty march of civilization will straighten their crooked courses and widen their historic channels, clear away the willows and cottonwood lining their banks; with the spirit of western progress, crude implements of agriculture and the primitive methods of farming must gently and gradually pass away, never again to return in all the ages.

The Taos valley embraces possibly 300,000 acres of agricultural and fruit lands; with abundance of water through conservation by storage for the entire area. The general elevation of this land is from 6,000 to 7,000 feet. Its mountain streams furnish an abundance of water; besides, there is a splendid underflow to be tapped by wells ranging from twelve to sixty feet deep.

The climate is the finest in New Mexico, and that means the finest in the West. Mild winters, a comfortable summer climate, bright sunny days and uniformly pleasant nights. Three hundred days of sunshine every year, a bracing air, perfect drainage, produce a healthfulness for those seeking that forceful feature among the other good things of life. Typhoid and malaria are unknown. Acute diseases rare, pulmonary troubles cannot exist and hay fever is unknown. It seems to be a country of longevity, as one meets here many men and women from eighty to one hundred years old.

Its soil is what might be termed "wash" or "filled" loam, the kind that never wears out. It is deep, active, responsive and full of life. Some of the lands in the Taos Valley have been farmed in a crude way for hundreds of years and are capable of producing enormous crops when properly cultivated. The lands of Taos are, therefore, not unproven, untried or experimental.

It is safe to say that there is sufficient water flowing from high mountain ranges east of this valley to cover every acre in the valley, provided the water is carefully handled, and this is entirely independent of the flow of the main stream of the Rio Grande itself.

A number of eastern and middle states men have recently become interested in this section and have made some fine development in that part of the valley lying south and east of the town of Taos. Owing to the fact that a ride of something like fifty miles by stage is necessary from one direction, and over thirty miles from another in order to reach the valley and the town of Taos, this section is but very little

Canal of The Ranchos Orchard & Land Co., Near Taos, N. M.

known. It is visited annually, in September, by a large number of tourists, who go in to witness the annual dance of the Taos Indian in their Pueblo and the town of Taos nearby, which is said to be a most interesting ceremony. The tribe, after whom the valley is named, are without doubt, the most advanced Indians in the United States today. They have always been kindly disposed toward the whites and are an agricultural race rather than a warlike one. It is said that owing to this fact many unfair advantages have been taken over this tribe by unscrupulous Indians of other tribes, as well as white people, with whom they have been brought in contact. These facts, however, do not appear to have soured their otherwise happy nature. They are, altogether, one of the most hospitable and interesting lot of Indians to be found on the American continent today.

Town of Ranchos, Taos Valley.

Their homes in the Pueblo of Taos, illustrations of which will be given in future issues of the IRRIGATION AGE, in addition to those shown herewith, are cleaner than the average home of the white settler throughout that section. They have some peculiar masonic ceremonies, with council chambers and lodge rooms in estufas, located below the ground and reached by ladders. Here, no doubt, some very interesting ceremonies take place, although it is said that no white man has ever been invited to join with them at such times as these. White people are welcomed, however, by the Taos Indians, and kindly treated while a guest within their pueblo.

Taos Indian Pueblo, Council Chamber Entrance in Foreground.

Valuable information was obtained while visiting these people in company with Dr. Martin, who is the government physician at Taos. Dr. Martin is well versed in the history of the Taos tribe, its legends and ceremonials, and he has consented to assist the editor of this journal in the preparation of some matter along the line of the early history of the tribe. This will appear from time to time in the columns of the AGE with suitable illustrations.

One of the principal objects in going into the Taos Valley was to study the work carried on by the Ranchos Orchard & Land Company, which has made fine headway in the reclamation of 15,000 acres of mesa land on what was formerly known as the Gijosa land grant, about four miles southwest of the town of Taos. This land lies in one compact body along the river banks.

This company is headed by Mr. A. L. Barker, of Hopkinton, Iowa, president; P. L. Thorsen, Denver, Colo., secretary; F. B. Wilson, Greeley, Iowa, treasurer, and Joe B. Warner, of Denver and Taos, manager. The Denver headquarters of this company are 625 Commonwealth building.

This company has completed, and has in operation, a ditch twelve miles long carrying sufficient water to cover 2,500 acres of land. One-half of that quantity has already been broken up and placed in crops and fruit trees, this work having been accomplished this year.

The ditch taps the Rio del Pueblo one and one-half miles west of the town of Taos, and follows the lowlands in a westerly direction for one and one-half miles, where it debouches onto what is known as the Mesa land, controlled by this company.

In addition to this a drainage ditch is to be cut, beginning south of the completed ditch, and about a mile in length, along the base of the mesa, to a sump, where the excess from ditch No. 1 will also accumulate. This drainage ditch will intercept and carry along the large underflow now going to waste. This underflow under-

lies the entire body of lowlands and is an enormous future source of water. From this sump, the water is to be pumped in two lifts of 50 and 60 feet each to the mesa above, and from thence distributed by ditch over the Company land. This ditch is to be about 8 miles long, and to cover about 7,500 acres additional.

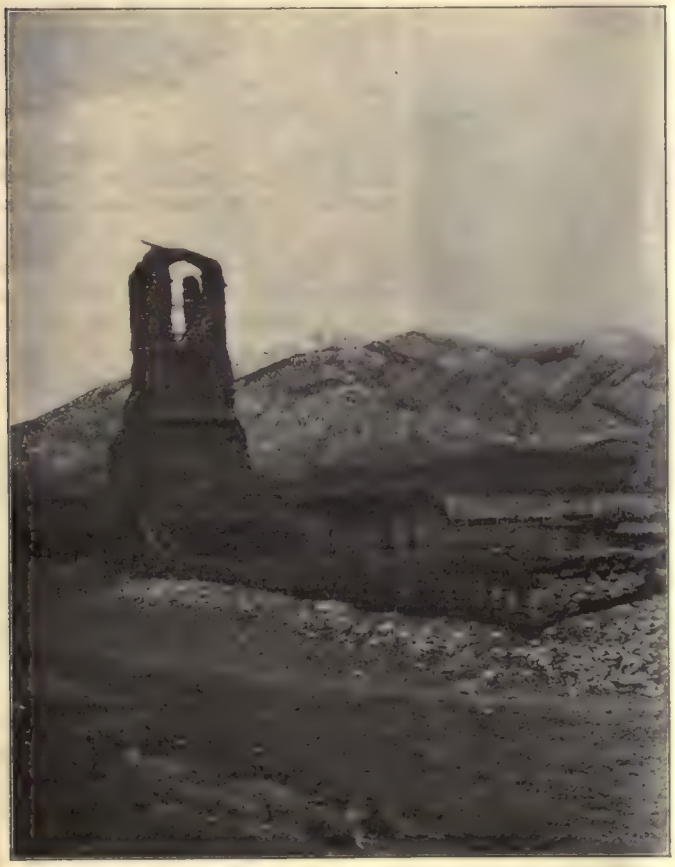
A power plant is to be built on the right bank of the Rio Grande river, which forms the northern boundary of part of the Company land, just above its confluence with the Rio Pueblo. At this point a diverting dam is to be built so as to give a fall of 25 feet on the wheels; the power canal will be some 500 feet long, part in tunnel, in which distance a fall of 15 feet is already available, and which will make only 10 feet of dam necessary. From this point the power will be transmitted to the pumps situated at the sump about eight miles distant, and the surplus from the old ditch and the water collected by the drainage ditch raises to the reservoir on the mesa, thence distributed.

Besides, the company has water rights on the Ranchos river, which water can be easily and cheaply run directly on to the upper lands by two miles of ditch, and covering from 1,000 to 1,500 acres additional land.

The water shed to this land consists of mountain country, 7,000 to 12,000 elevation, well timbered, where snow remains in summer, and rainfall is in the neighborhood of 20 inches. Its extent is sufficient to easily furnish water for every inch of irrigable land in the valley.

The principal field crops are wheat, oats, rye, barley, corn, sugar beets, alfalfa, peas and potatoes. Wheat is of a superior quality, of large plump grain, weighing fifty-five to sixty-eight pounds per bushel, and averaging

Pueblo River, Source of Water Supply for Ranchos Farms.



Old Spanish Church, Destroyed in 1846 During Taos Rebellion, Taos Pueblo, N. M.

on virgin soil from fifty to sixty bushels per acre. There are four flour mills in the valley. Oats yield forty, rye twenty, and barley is a heavy crop. Corn does well. Alfalfa produces five tons per acre. All kinds of vegetables grow to perfection and produce wonderful crops. Potatoes rank with the famous "Greeley Spuds," and cabbages weighing fifty to seventy-five pounds are not rare.

Field peas are grown there to such advantage and yield that a true statement of products would be doubted. When fed to lambs and hogs the yearly income per acre will double the price at which the lands of Taos are now selling.

It has been proven that the lands of Taos are fruit lands. One orchard has produced for twenty years without a partial failure—a record without a parallel in eastern or western orcharding. It produced this year $9,000 worth of apples from twenty acres, and its owner does not claim to have given it any special care or attention. A young orchard just coming into bearing on these lands sold for $300 per acre during the last year. Mr. C. E. Watson, of Chicago, has recently purchased 1,280 acres of land in this valley, and has shipped his entire equipment from Chicago, and is now making ready to plant 400 acres to orchard the coming season. Mr. Watson is one of the largest handlers of apples in this country. He has been a buyer of western apples for a score of years, is familiar with all of the fruit sections of the entire west, having visited them all and tested their products, and his selection of this location for his own investment should be all the evidence required upon this subject. A letter written by him upon this matter is convincing proof that it is taken into consideration that he and his associates will expend $250,000 in backing his judgment in the adaptability of the land in the Taos Valley

to successful orcharding. He will plant a nursery under the supervision of the most experienced experts, to supply the demands of the valley and to encourage the growth and development of fruit raising in this section. All fruits attain a size, color, flavor and yield that invariably astonish visitors from other fruit belts.

It is an established fact that sugar beets will grow to perfection, and with highest percentages in this valley, and the great acreage in one body will, in time, bring one or more beet sugar factories. The valley will support five such factories. It is not unreasonable to predict that it will secure at least one.

Conditions are almost unexcelled for poultry raising, bee keeping, dairying, creamery products, all of which will find a ready market at fancy prices. In fact, for diversified farming, on either a small or large scale, these lands cannot be equaled when prices and other conditions are considered.

Constructing Flume on Canal of The Ranchos Orchard & Land Co.

Valley of Ranchos River, Taos Valley.

Next to agriculture and fruit growing, the live stock industry is most important. Comparatively mild, dry winters, luxuriant growth of wild grasses, abundance of range, and plenty of pure water make stock raising very profitable. Sheep, goats, cattle and horses thrive. Hogs are very successfully raised, cholera being unknown, and the conditions are ideal for fattening.

There is plenty of lumber, timber, fence posts, lime, gypsum and building stone for all improvement purposes.

This land lies from six to thirty miles from the Denver & Rio Grande railroad. The St. Louis, Rocky Mountain & Pacific has a line surveyed through the lands, and it is completed and in operation thirty-five miles to the east of Taos. Another line into this tract is now being located, coming in from the north. Within two years this valley will have one railroad through it, and within five years, two.

NOTES.

The fruit growers of Palisade, Colo., have presented a petition to Congress asking that the farmers be paid for the lands condemned by the government for rights of way for government irrigation canals. The petition is based on the statutes of 1890, which provide that the land used for government canals or ditches across homesteads of pre-emption claims shall be paid for by the government. The fruit owners' claims aggregated $560,000.

A contract was recently signed between the Mesa County Irrigation district and the Palisade Irrigation district of Colorado by which the latter assumes control of both ditches under a long-term lease. Five thousand acres of land are involved.

The Denver-Greeley Irrigation Company has about completed arrangements whereby its district lying east of Platteville, embracing about 50,000 acres, is to be enlarged to include 40,000 acres more lying between Hardin and Roggen. Ample water will be furnished to water the added territory by the Standley lake project.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

America's Valley of the Nile

Scott's Bluff Country a Marvel of Fertility—Payne Investment Co. at the Sales Helm—Comment on Its Aggressive Tactics.

That is the striking and suggestive name recently given to the irrigated lands in western Nebraska along the North Platte river, particularly in what is known as the Scotts Bluff country. The name was first evolved from the fertile brain of that very resourceful man—George H. Payne, president of the Payne Investment company of Omaha.

The name is suggestive in the sense of expressing a marvellous fertility of soil. Tradition, history and statistics all combine to declare the Egyptian valley of the Nile the most fertile land in the world. To modernize seems to violate traditions, as if one had laid violent hands upon a sacred image.

Yet as compared with the modern Nile, under its new system of irrigation the application of the name to the Scotts Bluff country is fitting. The magic of irrigation is doing for that country just what the IRRIGATION AGE tells us is being done in many parts of the semi-arid west—making a garden from the desert.

Considerable of historic interest attaches to the Scotts Bluff country. The old "Oregon Trail" wound its sinuous way through that land, Mormons were massacred there. The first surveys for the Union Pacific in building its trans-continental line were made up this valley, but the work was abandoned on account of the persistently warlike attitude of the Indians, who plundered and murdered continually. The famous trail that led the goldseekers to fortune or famine, is now a great canal carrying a flood of waters and bringing back the gold that the pioneers of '49 failed to find. Yes, there is wealth in the mountains, but it is in the gulches and on the peaks and trickles down into the ditches and across the plains, and in this valley of the North Platte there is a Pharaoh in every town and a Joseph on every section who gathers each season great crops of wheat and oats and potatos, beets, onions and vegetables. The new "Valley of the Nile" is a land of plenty.

Unlike many of the irrigation enterprises, this valley has more water than can be utilized—there is not enough irrigable land to use it all. The Pathfinder dam built by the Government, miles to the west in Wyoming, is storing over a million acre feet while the valley below has only about 700,000 acres which can be irrigated. Little of this in Wyoming, and the largest acreage is in Nebraska, in the Scotts Bluff and Morrill counties. In the Scotts Bluff county are eleven irrigation canals, watering 153,000 acres as follows:

Minatare	9,000
Bayard	4,000
Gering	15,000
Mitchell	13,000
Winter's Creek	7,500
Enterprise	7,500
Central	4,000
Ram's Horn	3,000
Castle Rock and Steamboat	8,000
Inter-State (government)	37,000
Tri-State	45,000
Total	153,000

It will be noticed that the Tri-State supplies the largest area and it is indeed an irrigation enterprise of considerable magnitude. It is the successor to the Farmers Canal, organized as far back as 1887 and having a priority of water right to the extent of 1,143 inches per second. This right has since been recognized by the government in its reclamation service. Like many of the pioneer irrigation schemes, this one was not as successful as was hoped by its promoters. As the name indicates it was built by the farmers—men of small means. They had not the capital to develop the plans as formulated. It was sold to another corporation with unlimited capital and with stockholders who saw the opportunity. They invested largely in raw, arid lands and then began putting money into a big ditch. About $2,000,000 has been spent in construction

Plowing Out Sugar Beets in Scotts Bluff Country. As high as 33 Tons to the Acre Have Been Produced.

work and in acquiring lands. These lands of the Tri-State Land company are now being placed on the market and the Payne Investment company has had the work in hand since the first of May.

The old company undertook to make its own sales. There were no results, no one apparently desiring to invest in Scotts Bluff farms. It was then determined to place the lands in the hands of the Payne Investment Company of Omaha. This company has established a reputation in the west for handling large tracts, advertising them well, and having the deals closed up while other concerns were contemplating methods of operation. A notable instance of this activity and enterprise was in evidence last winter when the Keystone colony at Paxton, Nebraska, was established and 8,500 acres of land sold in sixty days.

So the Payne Investment company took the lands of the Tri-State Land company, perfected an organization of associate agents in various towns in Iowa and Nebraska, planned an advertising campaign, elaborate and expensive. Great attention was given to details and as a result the first excursion

The Alfalfa Mills at Omaha Pay a Premium for Scotts Bluff Alfalta Because of Its Perfect Color.

into the Scotts Bluff country carried about twenty prospective purchasers. The limitations were 160 acres to a customer; the prices from $70 to $80 per acre including water rights. As a result of the first excursion 1,840 acres of land were sold for $142,800. That was the result of two days inspection of the land and of the water supply. Two weeks later was the second excursion when 1,160 acres were sold for $86,400 and in another two weeks the third excursion, when 3,320 acres were sold for $241,400. The fourth trip brought the total up to $600,000, and the end is not in sight. It is a phenomenal record and one which is a matter of pride to Mr. Payne.

The general concensus of opinion among those associated with Mr. Payne is that it is "the Payne method" that makes the sales. It is the enthusiasm and personality of the man, which he imparts to others. Morover Mr. Payne never assumes control of a land deal of any kind in which he has not implicit confidence. His confidence is such that he is always among the first to make an investment. He is convinced that he has a bargain, buys what he can, and then sells to those who are interested.

Thoroughness and attention to detail are also strong points in the salesmanship organization. A special train was secured to run from Omaha. A tourist sleeper was arranged for, having a kitchen attachment. An expert cook and assistant, waiter and porter were taken along to look after the comfort of guests. No member of the party was allowed to open his private purse during the three days trip. Care was exercised in preparing the advertising. A semi-monthy paper called "America's Valley of the Nile," was handsomely illustrated and filled with spicy, suggestive irrigation notes. On the train a small daily paper was issued, giving bits of information and cracking jokes. A photographer caught pictures of the party at various points and these pictures were afterwards reproduced in the advertising matter, giving it a personal tone and a readable flavor. All these are parts of the "Payne Method."

Geo. H. Payne, President Payne Investment Co.

Of course when a man has something to sell and believes in it he can generally sell it. The Scotts Bluffs lands are ideal irrigation lands. They lie as beautifully as any in the country, with sufficient slope to make them perfect. The soil is a sandy loam, an alluvial deposit which has been years in making. There are many sections in which every acre is tillable and easily watered.

Nearness to market makes these lands desirable. Lands in Scotts Bluff country mean good markets not too far distant and that means good prices for produce. Lands in the Scotts Bluff country mean that one is not isolating himself and family, for there are towns and settlements in that valley nearly a quarter of a century old. In this valley and in its growing, ambitious little towns is all that makes life worth living. There are the churches, schools, social life, clubs; there are good roads, telephones and everybody enjoys the rural mail.

The climate is delightful, not too high, yet the air is bracing and invigorating, with cool nights in summer and plenty of sunshine in winter. Everything grows there that is possible in any irrigated land of like latitude.

As stated in the opening of this article the water supply is unlimited, exhaustless. With a water shed in the mountains of 25,000 square miles, the North Platte river will cease its flow only when the earth shall have melted away in fervent heat. The owners of the Tri-State Canal have planned a magnificent future. The headgates are as solid as steel and cement can make them, resistless when assailed by the spring floods of the Platte. The canal is built with a view not only to carry the needs, but an abundance of water. The headgates

remarkably well. One man in 1908 raised 30 acres averaging 28 tons to the acre. Another had fifteen acres averaging 25 tons to the acre, and reputable parties report yields as high as 33 tons. Potatoes are also a paying crop and Scotts Bluff bids fair to rival the famous Greeley spuds. In fact there is already a premium on Scotts Bluff potatoes in both St. Louis and Denver markets—and Denver is under the shadow of the Greely product. C. H. Irions, living near Scotts Bluff, raised 12,000 bushels last year, selling them for 48 cents per bushel, netting $96 per acre from 60 acres. Capitalizing his land on that return makes it worth $1,600 per acre. W. H. Haig of the same country had 80 acres in potatoes last year which netted him over $100 per acre.

Modern Method Used by Payne Investment Co. in Showing Irrigated Lands in the North Platte Valley.

are 130 feet in width and the canal 90 feet wide at the bottom for the first two miles. At this point is the sluiceway, built to remove the sand from the canal. It is depressed several feet below the level of the canal and when the gates are opened the water carries the sand back into the river. A great expense is saved in this simple operation. The check gates hold the water while this cleaning is being done and they too, are as substantial as modern skill and science can make them. Not a flume has been built along the entire length of the canal, about sixty miles in all.

As a basis of comparison it may be noted that the North Platte river carries nearly five times the volume of water in the Cache la Poudre which has made the Greely district in Colorado the famed country of the west. It carries four times the volume found in the Arkansas river, which waters the Rocky Ford district of Colorado.

The crops of this favored district are much the same as those of the Colorado country on the south. Sugar beets do

Instances of this sort can be multiplied. The soil is there, the water is available in any quantity desired, you have the sunshine and air. It is a country where one depends upon the "farmer man," not upon the "weather man," for crops. It is the home of alfalfa, every condition being ideal for perfect curing, and there is a big demand for the product. The mills of Omaha pay a premium for the Scotts Bluff alfalfa on account of its bright color and excellent condition. Some phenomenal oat crops have been grown, 135 bushels to the acre being the record, 80 to 100 bushels not being uncommon. Wheat produces from 35 to 45 bushels to the acre, cabbage will yield as high as 25 tons to the acre and onions are as prolific as in the Egyptian country on the other side of the globe. One man grew 2,700 bushels on four acres last year, for which he received $1,300, or a revenue of $325 per acre. All root vegetables do well and small fruits produce abundantly.

Those who have given careful attention to apples have

Spuds Will Make a Man Rich in the Scotts Bluff Country.

comparison. The Scotts Bluff lands will never make the orchards of the west slope of Colorado, nor of Washington and Idaho, but there is everything to show that one can make comparison with the famous Greeley district. The regularity of the land in this North Platte is unusual, there being miles of laterals following section lines, thus eliminating much of the waste land common in the districts nearer the mountains. So far as soil is concerned, it is in no way inferior to the Greeley soil and will undoubtedly produce potatoes of as good a quality and in as great a quantity per acre. In this respect it is superior to the Fort Collins, Loveland and Longmont districts, which grow no spuds. It is also better than the Fort Morgan and Sterling districts in this same respect, growing beets, alfalfa, oats, cabbage, wheat, onions and all vegetables in as great quantity and of as good quality as any other district, and also growing the potatoes.

The opportunities for future development seem unlimited. Heretofore the beets have been shipped to Colorado factories,

The Check Gates of the Tri-State Canal Are as Solid as Steel and Cement Can Make Them.

made a success of it, all local conditions having been carefully considered. In Morrill county is the orchard of R. F. Durnal, near Bayard. It has received considerable attention from Nebraska pomologists and is considered a horticultural phenomenon, being the furthest western orchard in Nebraska. It is only nine years old and has born fruit since the fourth year. The trees are set so close that there is only passageway between limbs, and the ground has a dust mulch, holding moisture to such an extent that irrigation will not be necessary this year, and there was but one last year. All kinds of apples raised in Nebraska are grown in this orchard. Mr. Durnal's orchard is on bottom land, hence subject to frost, but the trees are headed low and very little trimming done on the interior of the shrubbery, the trees forming their own protection against frost. The owner says if he were planting another orchard he would put it on the table lands, rather than on the bottom. This might require more water, but there would be less danger in the late frosts.

Naturally, those who have seen the irrigated lands of other states, particularly those of Colorado, are prone to make

Moonlight on the North Platte River at Scotts Bluff.

$4.50 per ton being paid for Scotts Bluff beets. The Great Western Sugar company has made a proposition to the people of Scotts Bluff to build a factory near that town in time to take care of the 1910 crop. The propostion has been accepted, and the contracts for 15,000 acres of beets are being signed up rapidly. Such an acreage means one of the largest factories in the world, capable of handling not less than 1,500 tons of beets every twenty-four hours.

In a prophetic moment Henry T. Oxnard recently stated in an interview at Washington that in ten years there would be ten sugar factories in that valled—provided, of course, Congress handled the tariff in a manner satisfactory to the sugar kings. Such a statement from such a soudce has considerable weight, but it is far beyond the dreams of the people of the valley, who have thought several factories would be built, possible one in each of the lively little towns of Scotts Bluff, Minatare, Bayard, Mitchell and Morrill. If such a condition prevails it means great things for that valley. One need not be either a prophet nor the son of a prophet to predict great and immediate growth for the towns of the valley. Greeley had a population of 3,023 in 1900; it now has 10,000. Fort Collins had 3,053 in 1900; it has almost 12,000 now. Longmont had 2,201 in 1900; it has over 5,00 now. Loveland had 1,091 in 1900; it has nearly 6,000 now. Fort Morgan was a village of 634 in 1900; it has nearly 5,000 now. Sterling was a village of less than 1,000 in 1900, and has nearly 4,000 now. Any of the Colorado towns with a sugar factory has quadrupled its population. Why? Not because of the factory, but because of the irrigated lands adjacent. The lands, not industries, are making the towns. This great valley is easily capable of sustaining a population of at least a million people. It will have them, and the children now playing on the village streets will live to see them thriving cities, the centers of bustling activities.

Cabbage Grows to Perfection in the Scotts Bluff Country.

Beet Dumps at Frequent Points Take the Product from the Farm to the Factory.

ATTALIA, WASHINGTON
On the Walla Walla.

Proof of Remarkable Fertility Found in Last Year's Crops —Fruit, Garden Truck and Alfalfa Are Bumper Yields —Lands Selling Rapidly—Members of Columbia Canal Company Retain Tracts for Personal Development.

The Attalia Valley is no longer an agricultural or horticultural experiment. It is a certainty. For a number of years products have been raised on a few small tracts watered by private irrigation systems. There are also a few in the valley who came in about the time the Columbia Canal Company completed its ditch, among whom are Mr. J. H. Sharry, Sylvester Linn and W. J. Ingraham.

Mr. Linn planted his tract to apples, pears, cherries and peaches and an acre and a half to alfalfa, planting two rows of strawberries and one of asparagus between each row of trees in the orchard. During 1908 he cut fifteen ton of alfalfa on the acre and a half, selling his products at an average price of $10 per ton in the field. In the spring of 1909 he marketed asparagus in March, the first bringing 30 cents a pound. His first strawberries were picked on the first of May.

Mr. Sharry planted his 20-acre tract to apples, pears, cherries and grapes and the entire space between the trees to alfalfa. In 1908, the first year after seeding, he got 98 tons of alfalfa and sold the entire crop to net him $9.50 per ton. The yield was considered a very good average, considering that only about half of the land was used, wide strips along the trees being left for cultivation.

Mr. J. B. Woodruff, in 1908, cut 6,000 bunches of celery from a patch 20x40, selling at an average of 5 cents a bunch.

Results such as the above have been produced under the Columbia Canal Company's ditch since the time it was completed. This district gained prominence in fruit growing early in the ninety's, as an exhibit of apples was sent from the Mills ranch, three miles from the town of Attalia, to the Chicago World's Fair, where it took first prize for quality, color and size.

About five hundred acres have already been planted, and it is expected that the spring of 1910 will see the entire valley under cultivation. Fully two-thirds of the lands have already been sold and with the rapid development that is now going on, it is not a question of sale of the land, as the demand is exceeding the supply. The people who have succeeded in attaining pieces of this land may feel lucky that they had an opportunity to buy before the advance in price which is certain in all irrigated districts as soon as development is well under way. A visit to Attalia will establish this fact beyond a doubt.

Dam and Headgate, Columbia Canal, Attalia, Wash.

The people already in the valley are erecting nice homes and are well pleased with the outlook. The Columbia Canal Company is showing its faith in the valley. In place of selling the land and retaining the money, they are gradually putting it back in improvements and publicity. Moreover, each member of the company is holding and developing lands for his personal benefit.

Mr. U. K. Loose, president of the company, has forty acres well on the way toward maturity. J. D. Bassett, treasurer, has a tract partly improved, and R. C. Dahlhjelm, sales manager, after a year's thorough investigation through his position with the company, invested in forty-five acres of the land. The lands which these parties hold individually are not for sale.

A New Home in the Attalia Country.

The development of a valley like this means a great deal, not only to the immediate vicinity, but to the entire Northwest. The valleys available for irrigation are so few and the demand for fruit is becoming so great that large enterprises are certain to develop. We cite for example the cities of North Yakima, Wenatchee and Kennewick. Only a few years ago these places were merely marked on the map and trains rarely stopped, but with the development of irrigated orchards they have grown to cities and are known all over the world for the excellent fruit which they produce.

In a great many places they were hampered by railroad facilities, having only one system and under adverse circumstances they forged ahead. The newer districts will know none of the hardships and disappointments which these places had to overcome. They can profit by the experience of others and need not waste in experimenting. The experimental stations maintained by the state know just what canbe done in each valley. They are continually sending out printed matter and their representatives are giving lectures throughout the country for the benefit of the new comer. It seems that the Attalia Valley has been more fortunate than the others. Nature has provided a great many things for this place. First the soil; second, the climate; third, water, and together with the inventive genius of man, transportation facilities.

GARDEN CITY KANSAS and VICINITY

Promise of Record-Breaking Beet Crop—Copious Rains Make Irrigation Unnecessary—Deerfield Pumping Plant Completed—Russian Thistles Exterminated—Alfalfa Crop Gives Great Promise.

BY R. H. FAXON.

A trip through the valley and a look on the south side just now is most profitable and remunerative. It will give an idea of the wonderful development in this Garden City section, and of the hope that no season ever brought to this country that compares with this.

Conditions just now in the valley and south side are perfect. The splendid fields of splendid beets, the waving alfalfa, lush, dank, luxurious, the many fields of wheat that are just beginning to catch the brown that precedes the golden.

In the neighborhood of 12,000 acres of beets makes the prospect for this year's factory campaign simply tremendous. There isn't a very good way for the layman to measure it, except to say that all signs and indications point to passing 1906 with absolute ease; and you know what that means.

A ride through the entire valley, and up north to almost the edge of the Shallow Water Empire, is an inspiring thing. It develops the fact that while there have been many rains and that each forms a crust over the ground, yet each succeeding one has moistened this, and the young beet has pushed through and is doing well. It has been cultivated, thinned, and weeded, already, in probably half the fields. In others, just an occasional one here and there; seeding has been tried late, and is now going on; but this is only a small percentage of the beet lands. The ditches are all running nearly bankful, and the water is not needed in most places. Reservoir No. 5 has more than 18 feet of water stored in it, and the repair of a break in the Great Eastern will put this number of feet of water much greater.

Of course, the great thing to the United States Sugar and Land Company is the completion and successful tests of the new south side pumping plant at Deerfield, near here. The fact that this work was pushed through in comparatively a few months; that it is an example of an imposing and substantial plant, sightly and attractive; the fact that not a test hung fire so far, and the kind of plant it is, make the completion and readiness for operation of more than timely moment.

The oil is introduced into the gas-producer, and air at the same time. After a short time, the heat is sufficient to create the gas, which is run off into cleaners, and the carbon, or lampblack, removed by centrifugal operation. The gas is then, partly by suction, partly by force, drawn by pipes to the west end of the plant, where it is run into the twin tandem 400-horsepower Buckeye engines. This produces the power from which the necessary voltage to run the transmission line and feed the pump-house is secured.

The Buckeye engine was made at Salem, Ohio, and is a clean, powerful-looking institution. It works perfectly with the gas-producer and seems to bid fair to become entirely successful.

The machinery is started from a distillate motor, 40-horsepower, made by the Western Gas Engine Company. That is one of the cleanest-cut pieces of machinery that a person ever saw. This motor starts all the machinery and pumps in the whole establishment to work, and runs the gas into the Buckeye engines, which then make the power. The gas and water-pumping machinery are then carried by an electric motor from the generator run by the big engine and the 40-horsepower engine stopped.

It is stated that with oil costing 85 cents per barrel, a little above the cost here, the plant will run with a cost not to exceed twenty-seven one hundredths, or a trifle over one-quarter of one cent per each brake horse hour.

Or, to put it in another way, running the plant with all the pumping station going and lifting 25,000 gallons of water 30 feet every minute, will require only one gallon of crude oil, costing two cents. This includes the loss generating the electricity, transmitting the long distance, transforming the voltage from 6,600 to 440, and the motor losses.

This amount of water would fill 600 barrels and make a pile standing 20 barrels high and 30 long, all done with a little one-gallon can of crude oil, costing two cents.

The transmission line runs out south and west from Deerfield, on the south side. There are fourteen pump-houses, made of solid cement, with telephone connection. There is one well close by the side of the pump-house and four others at right angles, making five in all. The average depth of the wells is 55 feet. The wells are 130 feet apart, a different plan than that of grouping at the government project. The 16-inch casing goes all the way down, instead of tapering from 16-inch to 9-inch at the bottom, as at the government project. Inside the pump house, the pumps are set clear at the bottom of the cement pit, to the water, thus saving suction. On test their wells pumped out 850 gallons a minute, but only 350 gallons are required of each well, or about one-third of test. The power into each pumphouse is 6,600 volts, which is transformed to 440.

The southside looks good, though much land is newly-broken. The new plant serves 4,500 acres, in all, and the sugar company has about one-third of this in beets and one-third in alfalfa. An effort to make a full inspection of the district was impossible on account of the condition of the roads, through which no car could safely pass in places.

A trip to reservoir No. 5, the largest body of water in the state of Kansas, is always profitable. There is now 18 6-10 feet of water in the reservoir, about six feet having been taken out this season. The present capacity of the reservoir is 18,500 acre feet, and by work now going on, the sugar company will enlarge this to 31,500 acre feet, and it readily will respond to greatly increased capacity beyond that figure. The banks will be extended at once to the northeast, and 100,000 cubic yards of dirt used. One million feet of lumber, Oregon fir, will be used in the construction of sheet piling for the dam's center, and 3,000 16-foot piles. The reservoir is a wonderful thing, and not the least of the sugar company's many possessions.

The sugar company's labor is fast taking on cosmopolite complexion. There are about 200 Mexicans, 350 Japanese, and 250 Germans now at work, thinning and weeding and otherwise doing the beetfield labor. The Mexicans live in tents, which they themselves bring in; but the Japanese and Germans require better furnishings—comfortable little houses, etc.

On section 17, 23-33, northwest of town, the company has recently built five more little houses, making eight in all. This is the Japanese colony in charge of K. S. Ase. Here the company itself is raising 450 acres of beets, and the work is satisfactory, and beet condition splendid.

Here is an argument for intensive farming that the writer cannot overlook: In the Michigan beetfields, the average farm is three and one-half acres; and the man who has 15 acres is considered foolish. The day of intensive farming and the general practice of winter irrigation cannot be too strongly impressed upon this section, and they mean its prosperity beyond recountal.

The government ditch is running bankful, with perhaps 150 feet head, and is being used by quite a good many, in spite of recent rains. The other ditches are also running rather full from the river's flood.

The valley is, generally speaking, comparatively clean from Russian thistles. It is the most hated thing in the beet-field, and great care is taken with its extermination. All the beet-men hope the board of commissioners and county attorney will fully enforce the law against this pest.

The little town of Deerfield, an industrial adjunct to Garden City, is humming. There is not only a single vacant house in town, but literally not a vacant room. The stores are doing a fine business, due to the irrigation, reclamation, and Sugar Company activity in this valley.

The beet tonnage will be wonderful; the alfalfa is a tremendous quantity; the new pumping plant is a mighty factor; the people are happy, and with intensive farming and winter irrigation, the most inconceivable future awaits the Garden City section.

Wheat Field, Ranchos, Taos Valley.

Engineers have been at work recently on what is known as the Nile Irrigation district, which lies to the south of Wiggins, Colo., and was organized about six months ago. It is now thought they will be able to get water from Bijou creek and hold it in reservoirs until the dry weather, when it will be turned onto the land. There is 30,000 acres in the district.

NOTES

The Gering Irrigation District, Gering, Neb., will refund its outstanding bonds, amounting to $217,000, issuing therefor 6 per cent twenty-year bonds, interest payable semi-annually. The canal covers 14,500 acres.

A public notice has just been issued by the secretary of the interior announcing that the fee for operation and maintenance of the Carlsbad irrigation project, New Mexico, for the year 1909, shall be $1.35 per acre of irrigable land, and shall be due on December 1, 1909, and that the same rate shall remain in effect for subsequent years until further notice, the charges becoming due on December 1 of each year.

The big dam on the Belle Fourche irrigation project, South Dakota, now contains approximately 1,000,000 cubic yards of material. When completed this dam will be one of the largest earth embankments in the world, and will contain about 1,700,000 cubic yards of material. The dam is now 70 feet high and 6,200 feet long.

TO DRAIN LOWER EGYPT.

The order to facilitate the drainage of agricultural lands in Lower Egypt, and thus prevent the deterioration of the soil through the stagnation of water in its lower strata, the irrigation authorities have decided, says the Egyptian Gazette, to put up lifting pumps on the principal lakes in the delta into which drains discharge, and lift water therefrom into the Mediterranean.

Diversified farming on Baker Irrigation Co.'s land (Sunnyslope), two miles east of Baker City, Oregon. For those who wish to combine good soil, abundance of water, unexcelled climate, and beautiful scenery with the advantage of living within three miles of the business center of a modern city of over 10,000 population, where there are superb schools, churches, amusements, and unsurpassed markets, will do well to investigate these five, ten and twenty-acre tracts. A view plate may be had from the above company.

Shoshone, Idaho

Steady Growth of City Augurs Well for Future—Retail Interests Thrive—Building Activity is Proof of Development—New Industries Are Forming—Climate Conduces Good Health—Notes on Crops and Resources.

Every point in southern Idaho, and particularly the town of Shoshone, teems with possibilities for energetic and progressive people, Shoshone, located in the very heart of the irrigation area of Southern Idaho, is the pioneer town of this section. It is one of the few places that are not of the "boom" variety.

The moment that the process of reclamation, under the Carey Act, of the arid lands of Lincoln and adjoining counties was well under way, Shoshone began a forward movement which bids fair to make it the leading town of southern Idaho. All lines of business are rapidly increasing, and today it is more prosperous than ever in its past history.

New buildings, both for business and residence purposes, are constantly in the course of construction, cement walks are being laid in almost every portion of the city, new additions and acreage tracts are being platted and sold so steadily that there is every indication of a continued and increased growth.

There are two national banks, and a promise of a third one, which are rated the most substantial institutions in the state. Two first class hotels; three large lumber yards; two drug stores; several large mercantile establishments; one newspaper; and numerous other industries make up a prosperous and progressive village. Its two elegant schools, with a $25,000 High School building under way, four churches, court house and other public buildings compare favorably with those of many cities several times its size.

With added electrical power soon to be supplied in unlimited quantities, other factories will be built and join in the procession to reap the benefits of a suitably located and prosperous city. Shoshone is favored with both an abundant water supply and a good electric lighting system. Local parties are establishing a brick yard and a cement block factory, while negotiations are under way for a flouring mill, elevator, and a steam laundry.

There is nothing fictitious in the term "Sunny Southern Idaho," for sunshine is the predominating feature. The total rainfall is less than fifteen inches, and this comes during the winter months. The noon-day temperature of summer is offset by the extreme dryness of the air, and one does not suffer from discomfort that is felt at even eighty degrees in the humid climate of the eastern and southern states. The nights are invariably cool, which is a sufficient statement to attract many from the Mississippi valley and the middle west. Seldom, if ever, does the mercury fall below the zero point in the winter time, and it is never cold enough to interfere with outdoor work.

Nowhere in this latitude is there a more agreeable climate to be found, nor one where good health is more unvarying than here. Pecular to the locality is the absence of cyclones, blizzards, hail, and thunder storms. The great continental divide lies along the north of us and not only protects southern Idaho from the Arctic winds, to which most northern states are subjected, but there the snow-capped peaks of these mountains furnish an inexhaustible and never failing water supply for the reclamation of the fertile sage brush lands.

At no place in the west can be found a more productive soil than that land which is tributary to Shoshone. It is a rich and fertile volcanic ash, free from alkali, with a slight admixture of sand, which makes it easily irrigable and much more adaptable to sub-irrigation than the heavier, or clay, soil. By actual analysis it is three and one half to four times more productive than the soil of Iowa or Illinois.

Besides cereals and vegetables, rye, clover, timothy, redtop, and fruits, such as pears, prunes and plums, are grown with ease. Currants, raspberries and all fruits give enormous yields. Strawberries are especially productive throughout a season lasting from the last of May to the middle of September. Apples, however, are the banner fruit crop of this section, as they so mature under the everlasting sunshine as to put on the reddest blush, and from the climatic conditions derive such a hardiness and firmness that after winter in cold storage, or even ordinary cellar storage, they emerge as firm and sound and crisp as the ordinary eastern apple at Christmas time. The eastern Jonathan apple does well to last until New Year, while the Jonathan of southern Idaho is in its prime in the month of March.

To the eastern farmer it will appear as an exaggeration to assert that 95 per cent of the butter used in the state of Idaho is shipped in from neighboring states. Neither has the supply of poultry and eggs for the local market ever been furnished from within its borders. These facts present a condition which the small farmer who is seeking for great profits cannot afford to overlook.

Another source of immense profit is the raising of hogs. They thrive to perfection when pastured on the alfalfa, which grows so readily and abundantly in this state, and there is no better finishing food for them than sugar beets and sugar beet pulp.

Southern Idaho in general and Lincoln County in particular is especially well adapted, both in soil and climate, to the growing of sugar beets. For highest yield in sugar it is necessary to have the cool nights to facilitate the formation of saccharine matter during the growth of the beet. Also, the absence of alkali in the soil is an important factor in the successful and profitable handling of the beets at the factory, and the crystallization of the sugar in the finishing processes.

It is predicted that in the near future Idaho will be one of the largest sugar producing states in America. Experimental crops here have yielded 22 tons of beets to the acre, showing by analysis to contain 19.7 per cent saccharine matter, while in other states the percentage is from 15 to 17. The Idaho Sugar Company have a standing offer of $4.50 per ton for beets grown on the Twin Falls South Side Tract, and this county being bisected by the main line of the railroad, is easily able to compete with any market. In addition to this there is every prospect of a sugar beet factory being established at Shoshone, the benefit of which to the farmers of the surrounding locality can be readily estimated.

One of the most remunerative occupations which has been overlooked in southern Idaho is the raising of bees. The broad fields of alfalfa furnish these busy little workers with an abundance of the best possible material for making a very high-grade honey. One apairy, located a few miles from Shoshone, with less than a hundred swarms, yielded last year to the owner a profit of $3,500. This is only an illustration of what can be accomplished in this line of work.

For those who are in poor health, there is no better place

than the high, dry atmosphere of this section. The only fever prevalent in this section is the fishing fever, as the streams are filled with mountain trout, and in the hills grouse and chicken are plentiful.

Map Showing Shoshone, Idaho, and Vicinity.

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Raw and Improved Carey Act Lands. Irrigated Farms. Five and Ten-Acre Fruit and Garden Tracts close to town. Stock Ranches with Unlimited Open Range. Large Tracts of Improved Land for Colonization Purposes. Business Openings

SHOSHONE LAND COMPANY

References: Any Shoshone Bank SHOSHONE, IDAHO **Write for particulars**

(Continued from page 336.)

then Secretary of the Interior. He determined to change the methods that had been employed, asserting that if it was possible for private enterprise to construct irrigation works that would operate successfully the Government could also do it, He was prompted to this course by reason of the fact that a large fund, amounting to nearly a million dollars, had accumulated to the credit of the various Indian tribes for this purpose and the further fact that irrigation was a factor in the execution of the plans of the department that could not be ignored.

To better equip himself to solve the difficulty thus presented to him he addressed a series of letters to the governors of the various western states where irrigation was in successful operation and to other prominent men largely interested in irrigation projects asking for suggestions as to the best method of attaining the result he desired and asking them to recommend some one competent to take charge and carry out the plants of the department successfully.

A consensus of the opinions received in answer to these inquiries recommended Mr. Graves as being qualified, both by experience and reputation for successful achievement and for the responsibilities of such a position.

In consequence of these recommendations the Secretary invited Mr. Graves to come to Washington and offered him the position of Superintendent of Irrigation for the department and appointment of Special Disbursing Agent for handling and expending the money that had accumulated in the irrigation fund, which he accepted and successfully fulfilled all the requirements of the office for the succeeding twelve years, resigning on the 15th. of May 1902.

While in the service of the Government, Mr. Graves instituted and constructed irrigation systems of various sorts, including storage reservoirs, pumping plants etc. on many of the Indian reservations throughout the country, and also Domestic Water Supply systems, Sewer systems and other improvements for the Indian Schools. In doing so he handled and disbursed a very large amount of money and in closing his accounts with the Treasury department received from the Treasurer a "Settlement Warrant" for sixty cents being the balance due him in the final settlement. This is certainly a creditable evidence of his fiducial reliability.

In leaving the public service he thought he saw an unusual opportunity to re-establish his engineering practice in the rapidly developing "Great Northwest" and subsequent events have amply justified his judgment and decision.

His long and successful professional career carries with it the assumption of sterling elements of character and more than ordinary ability as an engineer, and he has manifested an ambition to leave the record of it written on the face of Mother Earth rather than on the printed page.

WEISER, IDAHO,

The Land of Sunshine and Home of the Big Red Apple.

No other town in the wonderful Snake River Valley has better inducements to offer the homeseekers and investors than Weiser, Idaho. The altitude of this beautiful city, located on the bank of the Snake River, and the surrounding country ranges from 2,100 to 2,300 feet. The climate is mild; there are no cyclones, blizzards or sunstrokes. The winters are open, with some snow, but no wind. The summers are warm, with cool and refreshing nights. The fields of industry are many and varied, including mining, lumber, stock-raising and and raising of fruits and all kinds of products.

The industry of mining has received considerable attention in this section, there being indications of gold, copper and iron in large quantities.

The manufacture if lumber is carried on extensively in the northern part of Washington county, of which Weiser is the county seat.

The mountains lying back of Weiser afford fine range for stock during the summer months, with abundant supply of hay, grown in the valleys for winter feed.

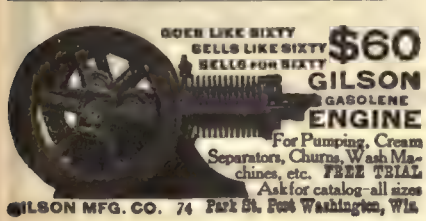
Too much can not be said of the Weiser Country concerning the possibilities of this section as a Fruit country, and every homeseeker thinking of undertaking fruit raising should visit the Weiser country before locating. There are many orchards now bearing and many more are being set out each year. The orchards now bearing bring large returns on investment. For example: A man set out thirty acres in orchard a few years ago. The first year it bore, the returns figured 16 per cent on the outlay from the time of starting the orchard. There were 185 cars of fruit shipped from the Weiser country during the season of 1908. Apples, apricots, cherries, berries of all kinds, peaches, pears, plums, prunes, melons and canteloupe do finely in the Weiser country.

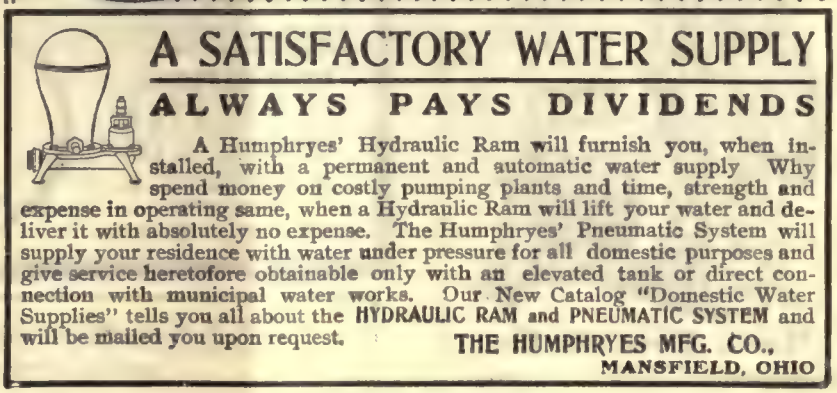
Fruit is not the only thing grown in Weiser country, as wheat, barley, oats, corn, potatoes, sugar beets, alfalfa and various other kinds of products thrive and yield large to the acre.

Land values are low in and around Weiser for the simple reason that there has never been a boom and at the present time land can be purchased at low figures.

The irrigation supply in the Weiser country is more than ample to the demand and no trouble is caused by lack of water. The Malheur Irrigation project, now being considered by the Government, covers approximately 150,000 acres of extra fine land and a large amount of the acreage is directly tributary to the city of Weiser. Over ninety per cent of the acreage under this project has been signed up for government irrigation.

The city of Weiser proper is a wide-awake, prosperous city of nearly 5,000, owning its own electric light and water supply and doing a business equal to that of many towns twice its size. It has several churches and has one of the best school systems in the Northwest.





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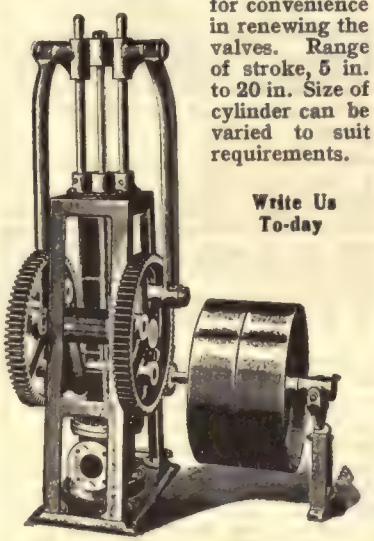

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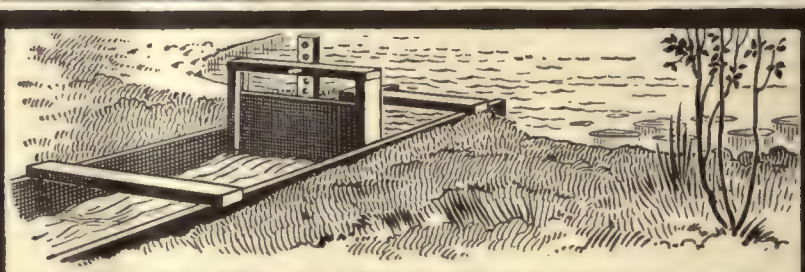

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Of course you cannot have your reservoir on your high ground. Locate it on the bottom land where it is easiest made and certain to be filled with drainage waters.

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These engines, always powerful and reliable, have been found to be excellently adapted to irrigation pumping.

They are operated with little expense. They require but little attention.

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The farmer who has a water supply of his own, so that he may irrigate a few hours now and again, without regard to whether the water is flowing in the company ditch, is the independent farmer.

A reservoir on your own land and an I. H. C. gasoline engine to give you the water when you want it, where you want it, is the solution of the problem.

The I. H. C. gasoline engine can be used for other purposes beside pumping. It is a general purpose engine, which will be found an all around handy farm helper—to run grinder, sheller, separator, fanning mill, washing machine, churn, grindstone, etc. The I.H.C. line includes besides Famous pumping engines and jacks, the following:

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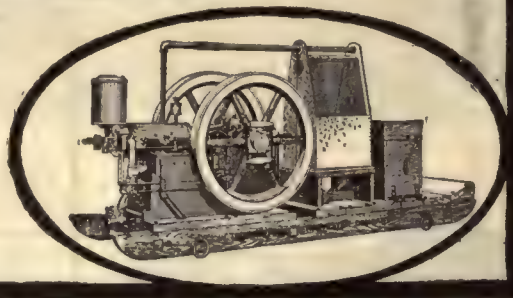

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(Continued from page 333.)

Pueblo is becoming well known over the West on account of her mineral waters. The city is underlaid with a stratum of mineral waters at a depth of about 1,200 feet. One large sanitarium is filled with people from the whole west who come here to bathe in and drink these waters. Another large bottling works plant uses these waters from another well and the efficacy of these waters is becoming more widely demonstrated.

Pueblo business men are energetic and active and are always willing to aid new enterprises coming to the city. They maintain a well organized Business Men's Association, which is ever vigilant to push the interests of the city. Homeseekers and worthy citizens are always heartily received. In the empire of which Pueblo is the metropolis there is plenty of room for thousands of home builders. Many of the resources are practically untouched and await the energetic labors of the farmer, the manufacturers, and the alert man of business. The banks of the city, of which there are seven, are generous in aiding new enterprises. They are well handled, financially strong and a credit to the city.

The article would not be complete without a word about the climate of Pueblo. Perhaps nowhere in America do the people enjoy a more nearly ideal climate than this city, known far and wide as Sunville. Comparison of total sunshine of Pueblo during the year shows that Los Angeles alone of cities in the United States equals Pueblo, each city having 75 per cent of possible. The altitude is 4,685 feet, giving the city a cool, equable, invigorating climate. The location of the city, south of the divide of the Arkansas and Platte, protects it from the biting, sweeping winds from the north during the winter. The mean annual temperature is 52 degrees, being five degrees lower than Denver. The total wind velocity during the year is less than twelve leading cities of the country located in various sections. The annual rainfall is about fourteen inches, and the city in 1904 had only forty-six cloudy days and only one day of fog.

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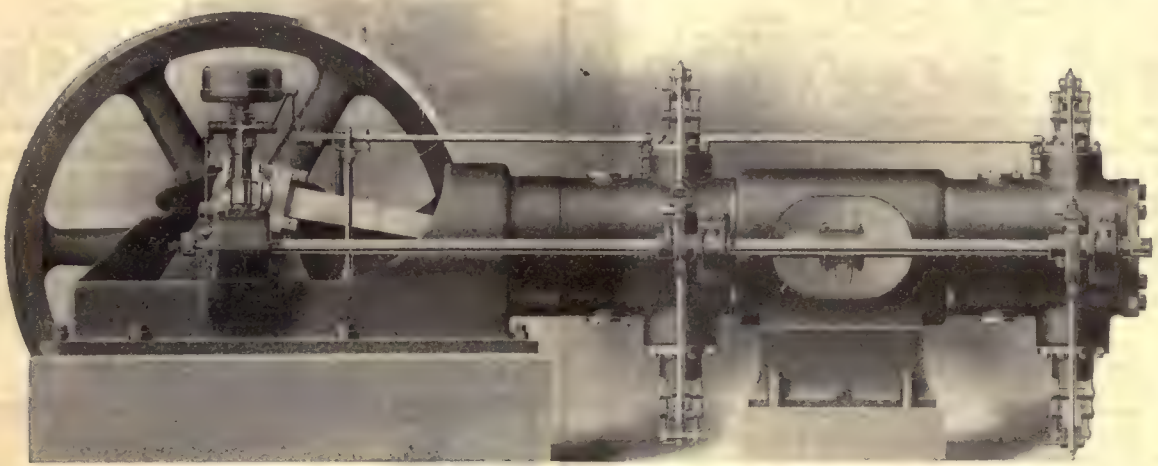

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Supreme Court Decisions

Irrigation Cases

The right to appropriate water for irrigation purposes where the doctrine of prior appropriation obtains is not confined to riparian proprietors.—*Boquillas Land & Cattle Company* v. *J. N. Curtis.* Supreme Court of the United States. 29 Sup. Ct. Rep. 493.

DUTY TO KEEP CANALS IN REPAIR.—

It is the duty of canal and water companies to keep their ditches and canals in repair, so as to carry the water to the several consumers along the lines thereof.—*Niday* v. *Barker.* Supreme Court of Idaho. 101 Pacific 254.

RIGHT TO WASTE WATER.—

Where a canal company furnishes an applicant with waste water from a drain ditch, supplied wholly with water wasting from other lands, the user thereof can not compel the canal company to maintain such waste water, even though a rental is charged therefor when used; for the rights of the user depend wholly upon the water wasted into the drain ditch, and his right thereto.—*Gerber* v. *Nampa & Meridian Irr. Dist.* Supreme Court of Idaho. 100 Pacific 80.

CHANGE OF MODE OF COLLECTING WATER.—

Where a water company had been diverting a certain amount of water from the wash of an artesian basin continuously for fifteen years, by means of cuts and trenches, it was entitled, when its supply began to fail, to drive wells in the wash by means of which the requisite quantity previously diverted was obtained from the same source of supply, as the wells only constituted a different means of collecting water.—*Barton* v. *Riverside Water Company.* Supreme Court of California. 101 Pacific 790.

RESPONSIBILITY OF WATER RESTS UPON CANAL COMPANY.—

Where the right to the use of waters from a canal has attached within the purview of the provisions of section 4 of article 15 of the constitution, and the water user pays or tenders the established water rental therefor, the question of the expense of delivery or the amount of waste by seepage, percolation, and evaporation can not be charged to the water user and consumer, but the burden and responsibility thereof rests upon the canal company.—*Nidday* v. *Barker.* Supreme Court of Idaho. 101 Pacific 254.

FEES OF STATE ENGINEER.—

Upon the issuance of a certificate by the state engineer certifying to the completion of the works necessary to apply the water to a beneficial use, he may exact a fee to cover the expense of the examination of such works from the person or persons, on submitting the proof of completion, as follows: For ditches and canals or other works having a capacity of 10 cubic feet per second of time, or less, a fee of $5; and where the capacity is more than 10 cubic feet per second, 30 cents for each second foot of the capacity of such works.—*Idaho Power & Transportation Company* v. *Stephenson, State Engineer.* Supreme Court of Idaho. 101 Pacific 821.

MEXICAN LAW.—

The grantee from the state of Sonora, Mexico, of land on the San Pedro river, can not claim to have acquired, under the grant, rights as a riparian proprietor of which he could not be deprived by a subsequent attempt to appropriate the water, since the doctrine of appropriation was, to some extent, at least, in force in that state by custom, irrigation having been practiced in the Santa Cruz valley prior to the cession to the United States, and the right of appropriation, without regard to the riparian character of the lands, having been in force there probably from the time when the Spaniards first settled in the valley.—*Boquillas Land & Cattle Company* v. *J. N. Curtis.* Supreme Court of the United States. 29 Sup. Ct. Rep. 493.

SALE OF WATER BY IRRIGATION COMPANY.—

A contract for the sale of a water right by an irrigation company, containing, as one of the conditions of such sale, unforeseen, or unavoidable accident which shall cut off or diminish the supply of water, or if the volume of water proves insufficient from drouth or from any other cause beyond the control of the company, the second party shall be content with his pro rata share of water which the company may have,

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and the company shall not be liable for the shortage or deficiency, and shall have a right to distribute such water as may flow through the canal or from the reservoir to the holders of such water rights pro rata, places all persons holding such contracts upon an equality as to the right to water when there is a shortage, and denies to any of such persons a prior or superior right over any other person holding a like contract.—*Jackson* v. *Indian Creek Reservoir Ditch & Irrigation Company, Ltd.* Supreme Court of Idaho. 101 Pacific 814.

ADJUDICATION OF PRIORITIES.—

A ditch was constructed to irrigate a part of each of three ranches in 1867; the owners of all the ranches using the water from that time. Adjudication proceedings were instituted in 1889, and the owners of two of the ranches, who were brothers agreed, in order to avoid any contention as to the amount of water each was entitled to, that one should make filing and prove up upon the 1867 appropriation, and that the other should claim under an appropriation made in 1881, but that both should thereafter own a half interest in the water rights they secured. The decree as to priorities did not conform to the statements of claim made by the three owners giving one of the brothers a priority as of 1867 as claimed, and the other brother priorities as of 1879 and 1881, and did not attempt to define the ownership of the different amounts of each, merely reciting their names, and provided that no part of the decree should be taken as affecting any claim of right between the owners or claimants of the ditch as between themselves, nor any claim of priority made as between parties using water for irrigation from the same appropriation. *Held*, that the decree was not res judicata as to the ownership of the priorities of the original ditch as between the original appropriators thereof or their grantees, and the statement of claim by the brother who did not claim under the 1867 appropriation did not estop him or his grantees from claiming thereunder.—*Park* v. *Park*. Supreme Court of Colorado. 101 Pacific 403.

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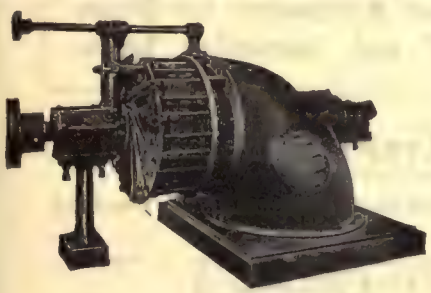

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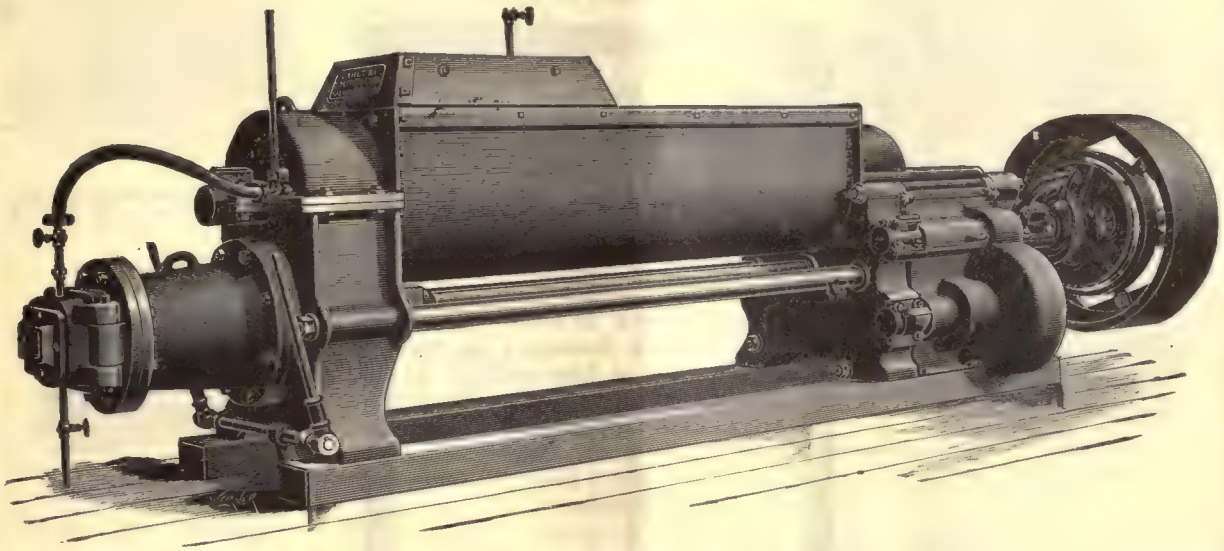

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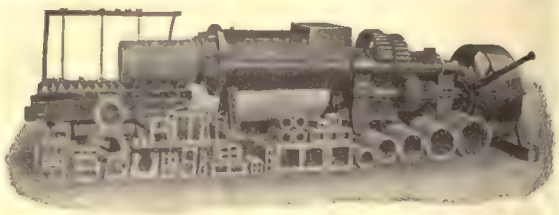

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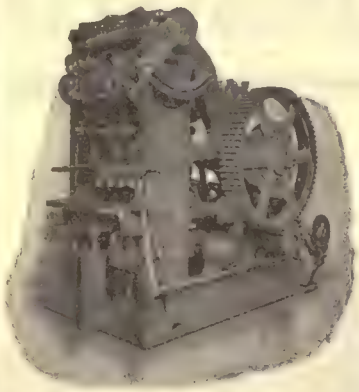

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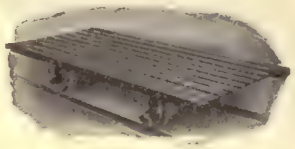

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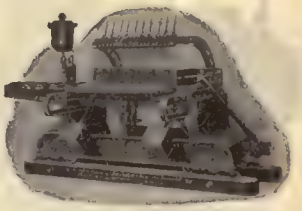

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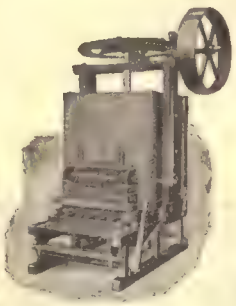

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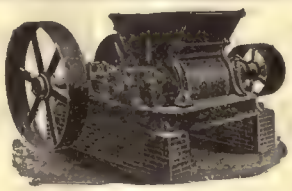

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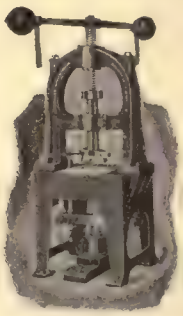

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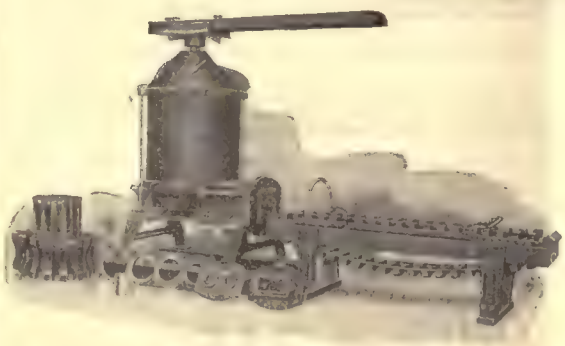

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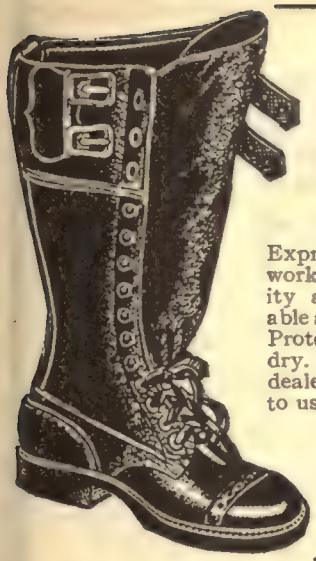

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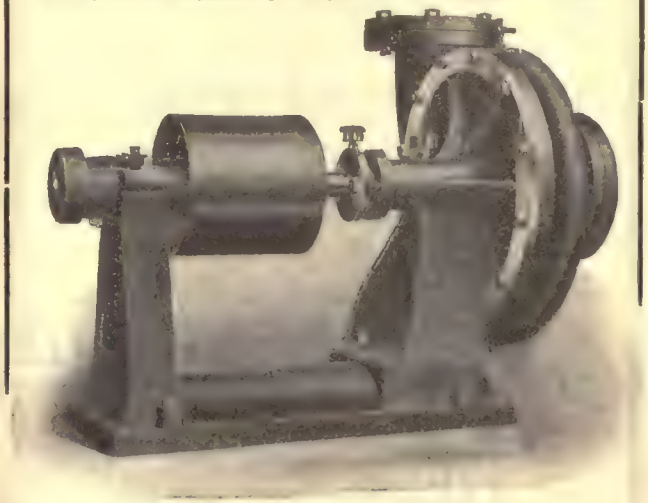

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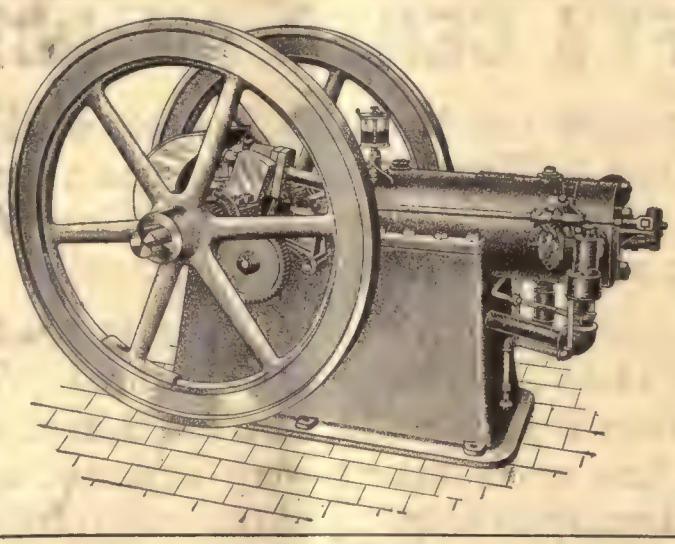

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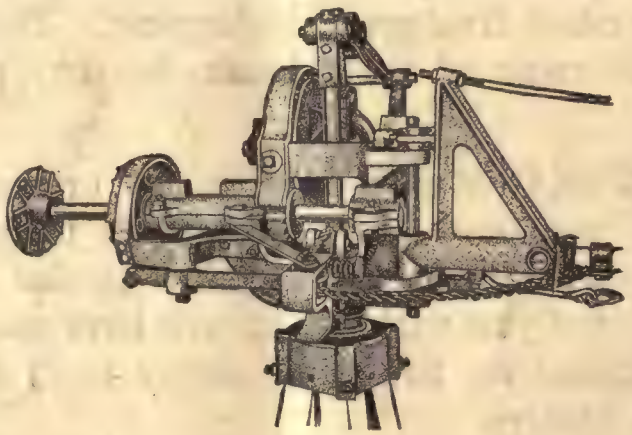

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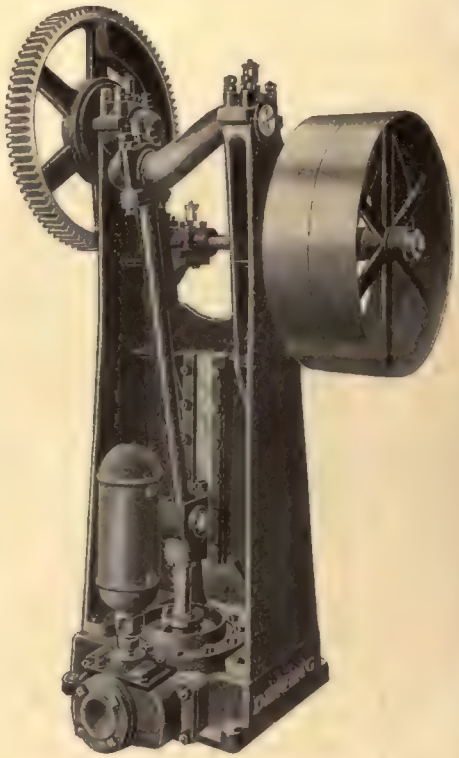

These Working Heads Can be Operated by Electric Motor, Gas or Gasoline Engine, Steam Engine or Belt Driven—the Motors and Engines being Direct Connected if Desired.

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"In no other portion of the United States can Dairying be so profitably carried on."—R. A. MOORE, Professor of Agronomy, University of Wisconsin.

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Why do you not get 10 or 20 acres of land in this choice location? You can, by doing so, make yourself independent in your old age, with a reliable income and a home of your own.

The question which causes many to hesitate at embarking in the business of fruit raising is the fact that four or five years must elapse after securing the land and planting the trees before the apples are ready for market. What to do in the meantime has been the problem in most irrigated countries. Don't hesitate on this account in your consideration of lands in the Spokane Valley. Do you know that these lands, when all irrigated, cannot overstock the near-by markets in melons, tomatoes, sweet corn and other vegetables? Strawberries, raspberries, dewberries and blackberries, which can be raised in wonderful quantities and can find ready sale at high prices in the city, in the mining camps, in the lumber camps and in the wheat raising country, all within a few miles, and all easily accessible at a very small cost of shipping. Our farmers have, in many cases, made fine returns from the crop raised between the trees as they expect to receive from their bearing orchards. There is a little more work to it, but the net return justifies it, and the markets at their doors make such returns as the following possible:

Justin Clark, Spokane Valley, Wash., states: "I sold $670 worth of dewberries from three-quarters of an acre of two-year-old vines."

W. G. Cook, Spokane Valley, Wash., writes: "One-fourth acre of onions yielded 70 sacks; sold at $1.20 per cwt., brought $105." This is over $400 per acre. Also: "We have had no killing frosts as yet, and tomatoes and such tender vegetables are still growing." (October 19th, 1907.)

Theo. Epling, Spokane Valley, writes: "I put in 1½ acres of early potatoes and sold $155 worth from that, and then planted the same land to table beets and now have as fine a crop as you ever saw, ready for the market. Will get at the rate of 8 tons per acre, I believe, and they are selling here at the rate of $1 per 100 pounds.

A. F. Ohlson, Spokane Valley, writes: "I raised 450 boxes of tomatoes from about one-half acre, which averaged 50 cents per box. I got $60 from less than one-fifth acre of dewberries (first year crop). Everything planted has grown in abundance and have had no trouble in selling all I could raise. My cherry trees, planted two years ago, are fully two inches in diameter and eight feet high; other trees in proportion."

A. M. Richardson, Spokane Valley, writes: "I have done especially well with potatoes (250 sacks per acre), tomatoes, squash and cabbage. Potatoes have sold at $1 per cwt. I consider the market the very best. Onions have done especially well and pay $350 to $500 per acre. My two-year-old trees made three to five feet growth since pruning in March, and some 150 feet limb growth per tree. My crops have been raised between trees."

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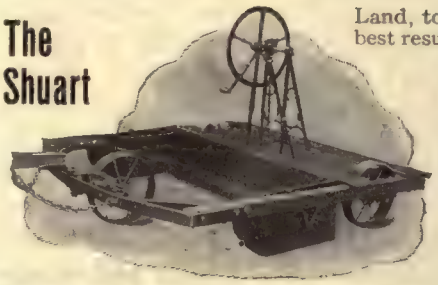

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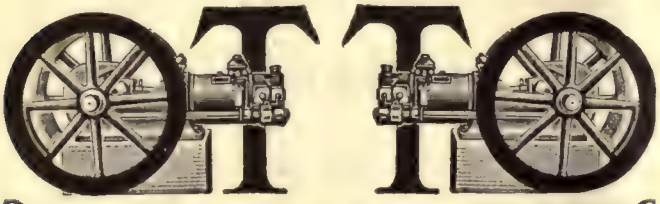

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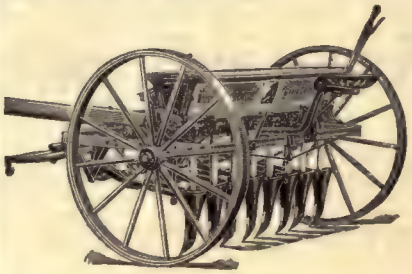

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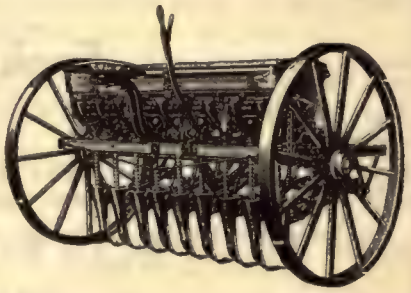

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THE IRRIGATION AGE

VOL. XXIV CHICAGO, AUGUST, 1909. NO. 10

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION — THE DRAINAGE JOURNAL
THE IRRIGATION ERA — MID-WEST
ARID AMERICA — THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,
112 Dearborn Street, - - CHICAGO

Entered as second-class matter October 3, 1897, at the Postoffice at Chicago, Ill., under Act of March 3, 1879.

D. H. ANDERSON, Editor

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, $2.00. If ordered in connection with subscription, the price is $1.50.

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Interesting to Advertisers.

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 24 years old and is the pioneer publication of its class in the world.

Spokane has spoke.

Five billions of dollars is some money.

Hurrah for the hurrah for the Irrigation Congress.

What valley does the Gunnison tunnel reclaim? Say it slower.

Now let Pueblo try her hand—then east with it, all together.

It is announced that there are to be fourteen different kinds of irrigation to be exhibited at the Spokane congress. Oh, what will the chasers be?

If J. Pluvius doesn't refrain from trundling out his hose cart and turning irrigation canals into drainage districts just before irrigation congresses he should be kindly but firmly rebuked.

When the Pathfinder dam was reported to be trembling in the balance a young government engineer hurried to the site. He wired his department as follows: "Arrived yesterday dam safe." Two hours later he was shocked with this query: "You or the Pathfinder?"

Just for the encouragement of those settlers who have already waited for several years for government water, we quote the recent weather report: "Deadwood had so much rain that it was cut off from the world for a week because all the railroads were washed away; Lincoln, Neb., had seven inches of rain in two days; Hebron, Neb., got four inches in two hours; Rapid City, S. D., was without a train on any of its four roads for ten days; the National Lumber Company lost 1,000,000 feet of lumber and railroad ties because of high water in Wyoming; every stream in western Nebraska and Wyoming is full. Farmers are digging ditches and putting in tiling for the purpose of draining off some of the surplus moisture."

Ruling Against Scrip Payment.

Reports from the west state that Secretary Ballinger is about to put an end to the co-operative plan of building government irrigation projects, and that hereafter all such works will be built entirely by the Reclamation Service and be paid for exclusively out of the Reclamation fund. Mr. Ballinger states that this was the intent of the law and therefore the plan must be followed out in the future. The decision comes from the Secretary's disapproval of the scheme devised by Director Newell of the Reclamation Service, under which settlers on uncompleted projects were permitted to work on canals, ditches, etc., and receive in payment for their labor a certain kind of scrip, which was later accepted by the Reclamation Service in payment of their water rights. In devising this co-operative scheme, Mr. Newell was undertaking to lighten the burden of those settlers who had taken land before water was available.

It is the opinion of many that Mr. Newell was right in this matter and that his move in this direction was of great assistance to many of the settlers who were with-

out bank accounts. He sought to give them employment at a time when their farms yielded little or nothing, and thereby to lessen the burden imposed upon them by the water payments demanded during the early years of their settlement when other expenses were heaviest. It appears now that in his effort to aid them, Mr. Newell devised a system that the law will not recognize, did not authorize or contemplate, and the plan is counter to the views held by Secretary Ballinger. It is said that if a system of co-operative construction is to be taken up, congress must amend the Reclamation Act to legalize a plan of this character.

The service or the Government could not in any way lose by this practice, and it can be predicted that Secretary Ballinger will use all reasonable effort to have the law so amended as to carry out the plan of Mr. Newell. The work contracted for under that arrangement was actually performed and the cost of the labor was shown on the books.

There are, to be sure, some features which should be corrected by some generally established system as laid down by an amendment, viz.: a regulated price for all labor performed by individuals or teams.

The scrip which has heretofore been issued will be honored and settlers who have been paid in that form will lose nothing. Scrip now in their possession is as good as the day it was issued. The Secretary does not intend to discredit any agreement entered into with the sanction of his predecessor. His decision applies only to future work. It is stated that Secretary Ballinger is acting under the advice of the Attorney General, who reported that there was no law for this co-operative system of building government irrigation works.

Pueblo Seeking Eighteenth Congress.

Having overcome every argument and obstacle that militated against its right to the Seventeenth Irrigation Congress, and with the keen support of every commercial organization within its limits, Pueblo is sending to the Spokane congress a delegation of boosters to press its claim for the gathering of 1910. Other cities have also marshaled their forces for the conflict and there promises to be a most spectacular fight over the selection of the place for next year's convention.

Logically the city of Pueblo is entitled to first consideration. Those who attended the sixteenth congress will remember the fight made at that time by Pueblo delegates seeking to gain for their city the present meeting. With commendable grace and courtesy, Pueblo then stepped aside in favor of Spokane.

Since 1908 Pueblo has grown. No more may the argument of insufficient hotel accommodations be considered, for Pueblo is prepared to construct one of the finest hostelries in the country before the next convention. Moreover, she is ready to entertain next year's visitors with all resources at her command.

Pueblo's commercial organizations are powerful and it may be confidently predicted that should the eighteenth congress be held in that city it will be eminently successful and the entire country be aroused to the importance of irrigation works and results. The movement is growing; let the congress go to that city, where it will be assured of greatest success—Pueblo.

To Solve Vexing Rio Grande Problem.

To reclaim 180,000 acres of land in the Rio Grande Valley at an estimated cost of $8,200,000, is the task which is now engaging the attention of the Reclamation Service on the Rio Grande River near Engle, New Mexico. This, it is stated, will be the largest irrigation project in the world. Some idea of the magnitude of this work, generally known as the Rio Grande project, locally termed "The Engle Project" and by other called the "Elephant Butte" project, may be had from the fact that the huge dam to be thrown across the Rio Grande will form a lake or reservoir more than forty miles long, and capable of storing two million acre feet of water. This project is a combination of two irrigation plans: (1) The diversion dam at Leasburg at the head of the Mesilla Valley. (2) The old Elephant Butte project, originally undertaken by a local water users' association. The Leasburg dam cost $200,000 and has been completed, and is now delivering water to the Mesilla Valley. This vast irrigation work, larger than the famous Assouan dam in the river Nile, Egypt, involves the construction of a rubble-concrete dam, 1,150 feet wide at the crest, 400 feet wide at the surface of the water, and 250 feet wide at bedrock. The base of this dam will be set 65 feet below the bed of the stream. The water to be impounded will form a lake approximately forty-five miles long, from four to six miles wide, and about 175 feet deep at the lower end.

That there will be more or less litigation over this project at some future time is the opinion of those who are well informed. The people of Southern Colorado and northern New Mexico and the San Luis and the Taos Valley claim a right to the water which is now passing their lands, and they will undoubtedly make an effort to control water from the streams arising in the mountains surrounding the valleys in which their land is located.

It is stated that the Government has forbidden the taking of water from these streams and it is predicted long drawn litigation will result. The peculiar features connected with the treaty with Mexico have created unusual comment. We are not sufficiently

familiar with all of the details, but intend to take it up with those who are well posted and exploit both sides in future issues of THE IRRIGATION AGE. The land owners in some of the valleys will be asked to state their side of the case and government officials will be requested to explain their position. Meanwhile, the motive and the cause leading up to the passage of this treaty will be investigated carefully, and it is presumed that some very interesting revelations will result.

Six-Mile Tunnel Under Mountain.

On July 6 the heading from either direction met in the Gunnison Tunnel, constructed by the Government in Colorado. This tunnel is expected to carry the waters of the Gunnison River through a mountain range into the Uncompahgre Valley, there to be used for irrigation. It is the largest underground waterway in the world, being six miles long, has a finished cross section of 10½x11½ feet and will carry 1,300 cubic feet of water per second. The tunnel will be lined throughout with cement, and the Washington authorities state that it will, when completed, cost about $2,500,000. Clippings from western papers and also information received from those who are familiar with the project, indicate that the cost will reach a very much higher figure—some say double that sum—which would bring the cost for water per acre to a very high figure.

Numerous difficult engineering feats were encountered in the construction of this tunnel, and it was necessary at various times to increase the acre cost of water as the difficulties made greater expenditure than was first considered necessary. The preliminary work on this undertaking was not only difficult, but in a sense spectacular, as the Gunnison River flows at the bottom of a canyon 2,000 feet deep, with almost perpendicular walls, which necessitated the surveys for the location of the tunnel heading on the river side being determined by lowering engineers from the rimrock down the face of the canyon by ropes. This work required both heroism and engineering skill of no mean order.

Actual work on the tunnel was of a necessity preceded by the construction of a road down the canyon walls over which supplies and heavy machinery could be carried. For over four years crews of men have been boring into the granite mountain from both ends of the tunnel. They have encountered all sorts of discouragements, gas, cave-ins, hot and cold water, running sand and treacherous material which required careful timbering in order to protect the workmen, but the work has gone on steadily day and night.

The lands in the Uncompahgre Valley are said to be among the richest orchard lands in the west, and with an ample water supply they will furnish homes for thousands of families who can easily pay back to the government the cost of building the irrigation system.

It is said by the wise ones that no other than orchard land experts would be likely to take up and develop property in the Uncompahgre Valley owing to the high price of construction which brings the acre cost to a higher figure than that charged on any other project so far developed by the Government.

The formal celebration of the opening of this tunnel will be held in September and it is expected that President Taft will be present with other distinguished guests who will take part in the program of the day.

This project will reclaim approximately 150,000 acres of land surrounding the celebrated Montrose fruit district. Homesteading will not be necessary on most of the land as the majority of the acreage was filed on years ago and is at present for sale outright at reasonable price per acre. Water-rights must be contracted for with the government.

Ballinger Studies Western Needs.

A new era is dawning for the irrigated west under the control of Secretary Ballinger, a western man, who studies carefully all problems that confront him. Under these conditions, the west may expect a square deal. It is safe to say that under his administration irrigation projects controlled by the Government will be carried forward more rapidly and satisfactorily than in the past. The predecessor of Mr. Ballinger, while a capable man, was not in any way familiar with the west. He secured the major part of his information concerning western affairs from bureau heads and many details, no doubt, came to him through Forester Pinchot. Mr. Ballinger is making a general tour of the west at the present time and will reach Washington in the fall, better prepared to meet the grave questions relating to western progress than any man who has ever filled this position.

People of the west may feel that their interests are in safe hands with Secretary Ballinger at the helm.

AMES PUMP CATALOG.

One of the most commendable of pump catalogs to come before the editor of the Irrigation Age during the past month is that put upon the press by the A. T. Ames Manufacturing Company, of Niles, Cal. In its explanations and description of the various classes of pumping machinery placed upon the market by this company the catalog is comprehensive and complete. Catalog No. 24, as it is called, approaches the artistic and withal is a most valuable booklet for buyers.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

PUMPING PLANTS FOR IRRIGATORS

The University of Arizona in an 8-page brochure by G. E. P. Smith, entitled "Timely Hints for Farmers, No. 67," makes the following suggestions of great value to those contemplating the installation of pumping plants, and to those whose present plants are unsatisfactory.

In the first place the location of the well demands attention. In many places the water table slopes so rapidly that in conjunction with the surface slope it dictates the location of the well that will have the lowest lift. Often differences in the water-bearing character of the formations nearby are the basis for decision. Especially is this true in narrow river valleys.

Shallow wells of great lateral dimensions are common in parts of Arizona. In places where shallow gravel beds are underlain by non-water-bearing strata they are justifiable. But more often the depths of the gravel beds are greater than can be reached by such wells, in which case drilled wells are far more effective in developing water. They cut across the bedding planes and tap more strata than a dug well, and since, as is well known, waters percolate along beds of unconsolidated gravels far more easily than in a vertical direction, the drilled wells are the best yielders.

Casings for drilled wells may be of the California "stovepipe" type, or, if the soil material is quite uniform and not too coarse, and short holes under fifty feet are desired, then the Kansas method can be used. This consists in punching slots, perhaps ⅛x1 inch in size, in heavy galvanized iron, and riveting the sheets into cylinders with the burr on the outside. Such wells, 15 inches in diameter and 20 to 40 feet long, make excellent feeders in the bottom of a dug well.

PUMPS.

The advantages of the centrifugal pump for the individual irrigator are so conspicuous and its adoption so general that the discussion will be confined to that type.

Pumps are usually purchased wholly on the reputation of the makers and without regard to details of construction. Little will therefore be said regarding these features. Both open and closed runners give high efficiencies if well designed and built. Much depends on whether the channels and blades are finished or left rough. Machining these surfaces adds materially to the cost but greatly reduces the friction and eddying of the water. In the best pumps the impeller, if enclosed, is cast in two pieces, and all surfaces of impeller and casing are machined and polished. Many pumps have only the runner machined. There are also many makes of pumps which are left entirely rough. These last are of very poor construction, very inefficient, and should not be purchased. The bearings of the pump shaft, or at least the outboard bearing, should be self-oiling of the ring-oiling type, end thrust should be compensated, and the packing gland should be of approved construction.

Where electric power is available, pump and motor should be direct connected on the same bed plate. Such a plant requires the very minimum of attention and should give a combined efficiency exceeding 48 per cent. Such a unit can be set deep in a well pit, just above the water level.

If the water table fluctuates greatly between wet and dry seasons a horizontal pump must either be set so high that the suction is apt to be too great or else it runs a risk of being submerged. A vertical pump can be run submerged and is especially adapted to cases in which the water table rises and falls greatly or to cases where the water level drops to the limit of suction when pumping begins. It is advisable to keep the suction lift less than 12 feet. If this cannot be done with a horizontal pump, then a submerged vertical pump should be installed.

Centrifugal pumps are exceedingly sensitive to change of speed and in each installation the most efficient speed should be determined and then maintained. A revolution counter should be purchased with every pump. Overspeeding may be justifiable sometimes, but never should the speed fall below the best speed.

Deep well pumps should be used in drive wells if the water level is at a considerable depth and the well is driven from the surface of the ground. Pumping by air lift is entirely feasible, though of low efficiency. A greater draught may be made upon a poor well by an air-lift than by any other method, but the cost of pumping is high and air lifts are not recommended where the lift exceeds 80 feet.

POWER.

The choice here is very wide. Gasoline and steam engines occupy the field at present, but in a few localities in Arizona electric power is available. Suction gas producers, hot air engines, and internal combustion engines using crude oil give promise of coming into use. Suction gas producers, especially, are well adapted to Arizona conditions, and will furnish cheaper power than any other type of plant except water power. They are only available for plants larger than fifteen horsepower.

Large irrigating plants should have a competent engineer. An efficient steam plant burning crude oil or New Mexican coal is at the present time preferred.

The small irrigator is usually not a mechanic and besides he is a very busy man. He needs an engine which will work with a minimum of attendance and repairs. A breakdown in the dry season may mean ruin. Small differences in efficiency are often outweighed by other considerations. The greatest care should therefore be taken to select an installation which will give the least possible trouble afterwards.

The symmetry of a pumping plant deserves far more consideration than it usually receives, especially in the case of gasoline plants where the fuel bill is the principal item in the cost of pumping. If the engine is too light the speed of the pump is too low; if the engine is too large its own efficiency is greatly reduced. *Both engine and pump should work up to full rated capacity, or nearly so.*

The symmetrical design of a pumping plant is not a simple matter. One unfortunate irrigator in the Santa Cruz Valley was recently observed to have around his well two boilers, two engines, and three pumps. He stated further that he had sent for a fourth pump

and thought he might have to change engines again. By this "cut and try" process a satisfactory plant may be ultimately obtained, but the process itself is ruinous.

PIPING AND CONNECTIONS.

There are many seemingly unimportant details which are under a purchaser's control and which if neglected cause great leakages of power and increase in cost of pumping or decrease in amount of water pumped. It has been our observation and experience that the worst features of recently installed plants have been in these minor details, and the consumption of fuel has been found doubled in many cases from this cause.

The pulleys ordinarily found on centrifugal pumps are so small that with the irrigator's usually loose belt the loss by slipping is very great. Larger pulleys for both pump and engine should be specified in the original order. Idler pulleys should be avoided, and friction clutches are unnecessary.

The belting best adapted to this country has been found to be a six-ply canvas stitched belt of the Gandy make. It is a perfect outdoor belt, while a leather belt rapidly goes to pieces if allowed to get wet and a rubber belt does not stand a hot and dry climate. The Gandy belt may be estimated at about eight cents per foot per horsepower, assuming that it is run at an economical speed. A belt connection should not be less than 16 feet center to center of pulleys.

The foot valve with strainer, usually unsuspected, is undoubtedly a great offender. The strainer rarely has sufficient waterway. It should be of very ample and generous size, and the foot valve should be abandoned. Either a check valve placed immediately above the discharge opening of the pump, or, even better, a flap valve which can be lowered over the outlet of the discharge pipe, should be used. In either case the pump can be quickly primed by means of a pitcher-pump attached to the pump casing or by a steam siphon. The siphon, or ejector, is recommended for all plants operated by steam power.

SUCTION AND DISCHARGE PIPES.

The suction and discharge pipes should be materially larger than the pump openings. Doubling the diameter of a pipe reduces the internal friction loss to about one-thirty-second of its value, assuming the discharge to remain unchanged, and reduces the energy head of the escaping stream to one-sixteenth of its value. The advantage, therefore, of large size piping is readily apparent. The following sizes of piping are recommended for the more common makes of centrifugal pumps:

Diam. of Pump Opening. Inches.	Diam. Suction and Discharge Pipes. Inches.	Diam. of Pump Opening. Inches.	Diam. Suction and Discharge Pipes. Inches.
3	5	6	10
4	6	8	12
5	8	10	15

Where two suction pipes are used the diameter of each should be that of the pump opening. The discharge pipe should be connected through a tapered increaser about four feet in length, and the suction pipe should be connected through a reducing elbow or a straight increaser.

The pump should be placed low so that the suction lift is as small as possible, or it may run submerged in the case of vertical centrifugal pumps. When the pump and pipe joints are well packed there is no advantage in the lower lift except for the easier priming, but when a gland packing becomes worn the efficiency of the pump is lowered by a high suction head. Suction of more than 20 feet is difficult to maintain with any pump, but more especially with centrifugals. The suction pipe, however, should be considerably longer than 20 feet to prevent air from being sucked down the side of the pipe.

If elbows are necessary they should be of the "long sweep" type. Steam fittings have usually been employed, but a column of water does not change direction with the same ease as steam. The cost of the long sweep fittings is no more than that of standard steam fittings.

CATTLE SPRAYING.

It is common knowledge that the mosquito, the ordinary house fly and like insects, are carriers of many kinds of dangerous diseases among members of the human race. Consequently, radical means are adopted for their prevention and extermination as far as possible. But if they are carriers of disease among humanity, a vast number of the insects that infest cattle are diseases in themselves.

Clinging closely to the skin of the infested animals, they will suck their blood and rapidly sap them of all vitality. Unless some other extremely apparent cause is discovered, weak and emaciated cattle can be attributed to the presence of lice or other similar parasites. This is one of the chief causes of troubles that are sometimes placed at the door of another source, showing itself in different ways, but really being due to the poor condition of the cattle so affected, making them susceptible to diseases they would not otherwise contract.

Spraying the cattle themselves with a low solution

Kerosene Sprayer. Oil and Water Are Thoroughly Mixed in the Plunger Tube in any Percentage Desired.

of kerosene, or prepared solutions manufactured for this purpose, has accomplished surprising results in ridding stock of insect troubles. A regular spraying of all barns, kennels and poultry houses does much to eliminate such troubles.

In the South, considerable trouble is experienced from the tick, which is a great carrier of the Texas or "accli-

mation" fever. To get rid of these, the cattle are driven through a wooden tunnel from one field to another, and as they pass through, they are thoroughly saturated from all sides by an automatic sprinkler or spraying machine. Experiments have proven conclusively that many thousands of cattle are saved to the South by preventative spraying. This is practiced generally where large herds exist—the small hand sprayer being sufficient for the majority of cases.

Large vats are sometimes used by some stockmen and the cattle dipped in these. In dairy herds where horn flies exist, a thorough spraying during milking, for six days in succession with one per cent Kreso or other similar solution, will greatly decrease the pests. The flies die as soon as the solution touches them and it should be so directed that it will play directly upon them. Spraying them on consecutive days kills the new flies which hatch from day to day, so no new eggs are laid. Every dairyman will find this practice of value. It may be

Small Bucket Sprayer. For Applying Stock Solutions. All Brass and Very Efficient. Manufactured by the Deming Company, Salem, Ohio.

necessary to repeat the process at irregular intervals during the summer, but the time used is well spent.

All lice infesting horses, dogs, and hogs, can be quickly exterminated by spraying with Kreso or a like solution. These different solutions can be obtained from any drug store. Spraying outfits, such as those in the illustrations are sufficient to do the work, and, in addition, they can be used for other purposes when the cattle spraying is done.

ELEVATING WATER.

Hydraulic Ram Possesses Many Values and Economies for This Work.

The problem of elevating water from springs, creeks, rivers and other natural sources, has held the attention of the people from the time the work began, and the evolution of the pump is most interesting. For ages no ideas of pumping water were entertained; it was always carried upon the heads of the slaves in crude vessels which were filled by means of dipping them into cisterns and other sources of supply. Then the ancient Greeks and Romans adopted the gravity system. This in turn was surpassed by the endless chain of metal buckets revolving over a wheel turned by hand. This was succeeded by the chain pump with its saucer-like carriers so well remembered as preceding the plunger pump, which sucks the water up and delivers it through a spout to be conducted wherever wanted. This method is most commonly used at the present time, and the power is furnished by hand, windmill, engine or other sources. The gravity system, however, is the most economical but not always feasible, as the tendency of man is to build his home, barns, factories, etc., upon high land. This is overcome, however, by the hydraulic ram.

The hydraulic ram, from all information obtainable, was invented by John Whitehurst, of Derby, in 1775. The machine he is given credit of inventing required an attendant to open and close the impetus valve. The first automatic hydraulic ram was invented by Joseph Michael de Montgolfier in 1796, and upon his principle is based the principle of the Humphreys Improved Hydraulic Ram. Humphreys' Improved Hydraulic Ram is one of the simplest, and at the same time one of the most unfamiliar of all the various forms of pumping machinery. It is an automatic pumping device which utilizes the power in a moving column of water to pump part of that water to any desired point. It consists essentially of an air chamber, an impetus valve and check valve mounted on a suitable base. The ram is placed two feet or more below the level of the source of supply, and is connected to it by means of a pipe, called the drive pipe.

The operation of the ram is entirely automatic. The impetus valve is a device for suddenly arresting the flow of water to the ram. The water flows through the ram until its momentum is sufficient to close the valve. The valve closes suddenly, and on account of the inertia of the moving water, the pressure within the ram is increased to several times that due to the weight of the water alone. This increased pressure causes the check valve, under the air chamber, to open, thereby permitting a portion of the water to flow into the air chamber. This compresses the air in the air chamber until its pressure is equivalent to that produced by the sudden closing of the impetus valve. The sudden stopping of the flow of water produces what is virtually a recoil in the moving column of water. This tends to decrease the pressure, or to create a vacuum under the check valve and impetus valve, thereby closing the check valve in the air chamber and entrapping the water therein. This decrease of pressure under the impetus valve causes it to open. This again permits the water to flow into the impetus valve as before, until it is closed by the momentum of the water. When in operation, the impetus valve rises and falls at a uniform rate, which may be abjusted to meet the conditions. Every time the impetus valve closes, the check valve opens to admit the water to the air chamber. The delivery pipe to the storage tank is attached to the air chamber below the water level. The air under compression in the air chamber forces the water through the delivery pipe in a steady stream to the point desired. The impetus valve is so designed that, by the action of the water, is is caused to partially rotate at each stroke, thereby insuring even uniform wear upon the seat.

The action of the ram is entirely automatic. It will pump night and day for months without attention, except perhaps an occasional visit of inspection. A constant air supply is assured for the ram by an automatic intake valve located on the base of the ram, adjacent to the air chamber. It opens and closes with each complete stroke of the impetus valve and prevents the air chamber from filling completely with water, due to the gradual absorption of the air. A small spray of water will escape from the valve at each stroke, showing that it is working properly.

The efficiency of the ram varies with the ratio of the vertical head on the ram to the vertical distance pumped. As a means of lifting water, it is more efficient than any other device working under similar conditions.

The Humphreys' Improved Hydraulic Ram is of exceedingly simple construction. The air chamber and the body of the ram are made of the best gray cast iron, and the impetus valve is made of brass, which is best adapted to meet the wear upon it. The base and air chamber are practically indestructible, and the valves will last for years. The facts that tell of an improved hydraulic ram are that the cost of same is limited to the first cost, which is very slight indeed in comparison with the cost of windmills, gas engines or motors with pumps, that would be required for the same duty; also no cost of operation after once installed; no attendants required, and adjustable to

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Government Completes Gunnison Tunnel

Greatest Undertaking in History of Irrigation—Channel Penetrates Mountain Base—More than 150,000 Acres Reclaimed.

On July 6, when workmen tunneling in opposite directions through the base of a mountain, the peak of which towered two miles above, touched drills and removed the last barrier of granite, the government had completed the Gunnison tunnel, the most gigantic irrigation feat in history.

Late in September, with fitting ceremonies and the presence of statesmen and scientists, the water will be turned into this tunnel from the Gunnison River and as it rushes through the base of the mountain to the arid fields beyond, it will reclaim to agriculture and industry a tract of 150,000 acres.

Whatever credit belongs to the achievement of this great undertaking may be given to government engineers. Two previous efforts, first by the State of Colorado, in which the land is located, and second, by a contractor, working under direction of the Reclamation Service, ended in failure. After long deliberation and extensive surveys the government, through its reclamation department, then started the work that has ended in complete success.

In length and the volume of water transmitted, the Gunnison tunnel is the greatest in existence today. It is approximately six miles long, has a finished cross-section of 10½x11½ feet, and will carry 1,300 cubic feet of water per second. The walls will be cement lined throughout and there will be generated about 10,000 horse power at the fourteen intermediate drops. The total cost is estimated at from $3,500,000 to $4,000,000.

Since February, 1905, when the government had completed its survey and started active work on the tunnels, from 500 to 800 men have been employed in three shifts. Two villages of considerable size have been established near either end. These were under government control and were largely for the accommodation of workmen.

While access to the shaft head from the Uncompahgre Valley was easy, most troublesome obstacles confronted engineers in making way for the beginning of work from the Gunnison River side. Waters in the stream, confined to a narrow channel between the mountains, rose at frightful speed during the flood season. So precipitous were the walls of this canyon that a road to the head of the tunnel must be cut from the solid granite of the mountain before workmen and machinery could reach the operating point. This road is twenty-three miles in length and at certain points the grade exceeds twenty-three per cent. Heavy machinery and instruments for use at this end were transported with the utmost difficulty. So great was the flow of water, encountered in penetrating the mountain from this direction that immense pumps, capable of handling 750,000 gallons each twenty-four hours, were required for constant operation.

Unusual difficulties were met during the course of the work. Because of the volcanic structure of the mountain, interior lakes and streams were tapped and penetrated. Hot waters, quicksands, gas and various other obstacles presented barriers to continuous work, and demanded engineering ability and resource to be overcome. Choke damp delayed work for three weeks at one time and forced the construction of a ventilating shaft nearly 700 feet in depth. More than 500 feet of the tunnel were driven through a fossil formation, yielding so readily to force that special timbering was necessary.

In the progress of the work it was necessary to construct two sections of electric railroad and a telephone exchange. An immense power plant for producing electricity for use in drilling and operating the electric line was constructed by the government.

From the Uncompahgre end of the tunnel the waters will be conducted to the Uncompahgre river, a distance of twelve miles, through a canal in which there is a drop of 214 feet. Power plants will be built at fourteen points along this canal and electricity thus generated will be

View of Gunnison River and Deep Gorge Through Which it Courses. In the Foreground, Power Plant near East Mouth of Gunnison Tunnel.

used for commercial purposes in the valley. Laterals and ditches completed by individuals in their efforts to lead water to certain parts of the valley are now under control of the government. These will be welded into a comprehensive system for distributing the flow equally to all parts of the valley. New canals will be built, thus bringing under cultivation much of the upper mesa land, which is red, sandy soil, unequaled for the cultivation of fruit.

Under irrigation Uncompahgre Valley lands have yielded the most astonishing returns. Tributary to the city of Montrose are 2,000 acres of bearing orchards, the annual income from which averages $300 per acre. Fruit in some instances has commanded the remarkable sum of $1,000 per acre, being sold on the trees and representing

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Government **RECLAMATION NOTES** Private

Under this heading the IRRIGATION AGE will hereafter run reports and news relating to irrigation projects—both government and private—gathered from the various sources at its command. Readers of the AGE are requested to assist the editor by sending reports of local projects, new organizations or progress of outlined work in their vicinities.

COLORADO

SWINK COMPANY INCORPORATES.

Articles of incorporation of the Swink Ditch & Reservoir Company, one of the largest irrigation systems in the Arkansas valley, and of the Apishapa Development Company, an auxiliary company, were filed recently at Pueblo, Colo. The Swink company is incorporated with a capital stock of $1,000,000. It will operate in Otero, Pueblo, Huerfano and Las Animas counties and will have headquarters at Rocky Ford. The incorporators are: George W. Swink, Homer E. Brayton, and John H. Voorhees. The directors for the first year are: George W. Swink, Lewis Swink, Schuyler O. Swink, Lorenzo C. Swink and Hiram A. Dawley. In addition to a large system of canals, the company has five reservoirs.

The Apishapa Development Company is capitalized for $100,000 and is empowered to own lands, build ditches and otherwise develop the properties. Directors are: George W. Swink, Lewis Swink and Schuyler O. Swink.

Details of the work by which water from Boyd Lake is to be carried to 8,000 acres in Weld and Larimer counties, are about completed. The project will require a pumping plant to lift water from the lake into a receiving basin, and a 4,000-foot pipe line will carry the water to ditches built around the high land. From these ditches a siphon to cost $15,000, will take the water across the valley to other high ground in the Oklahoma country.

Engineers, working under direction of an irrigation company formed of local capitalists, are said to be making surveys along the Purgatoire River in Colorado, with a view to extensive operations.

Reports from Greeley, Colo., state that a petition will be presented to the commissioners of Larimer county to establish a new irrigation district of 6,000 acres on Oklahoma Hill, to receive water from Boyd Lake by centrifugal pumps. Part of the district will probably extend into Weld County.

A syndicate of Colorado Springs capitalists has purchased a one-half interest in the Farmers' Irrigation Company of Silt, Western Slope. The system will be enlarged so that 4,000 acres of land owned by the Antlers Orchard Company will have water. The total improvements now under way will cost $400,000 when completed.

The Valley Irrigation Company is surveying and drawing plans for the building of a reservoir in Smith canon, about twenty-five miles south of La Junta. Present plans include a dam eighty-five feet high and a reservoir that will hold sufficient water to irrigate 35,000 acres of land tributary to La Junta.

The Two Buttes Company has concluded negotiations with the Colorado State land board for the construction of a canal along the line of Baca and Browers counties in that state. It is reported that the company will expend nearly $350,000 in the reclamation of 23,000 acres. Settlers on the tracts involved are offered a water supply at $35 per acre.

Several farmers in Otero County, Colo., have brought suit against the Twin Lakes Land & Water Company, charging mismanagement of the affairs of the Bob Creek or Colorado canal in this district. Plaintiffs assert that the company has been selling water rights beyond the capacity of the canal, that the priority of right is not observed, and that in other ways the company has violated the articles of agreement.

Steps toward the formation of an irrigation district at Garry, Colo., have been taken and it is reported that the organization is nearly completed. It is planned to construct the Big Beaver reservoir, surveyed about three years ago, and to reclaim about 30,000 acres. The company is said to have arranged for the sale of bonds aggregating $50,000.

Among the newly formed irrigation districts in Colorado is that known as the Denver Suburban Irrigation District, involving holders of land along the English High Line Canal. Organization is being perfected to regulate the use of water and about 60,000 acres are affected.

Property owners in the Denver-Municipal-St. Vrain Irrigation District, near Greeley, voted almost unanimously in favor of the proposed district. The property holders will vote bonds and work of construction will begin to provide irrigation for southwestern Weld County, heretofore considered only a mining district. Within sixty days, it is said, a big force will be put at work building 100 miles of ditch for the Denver-Greeley Valley Irrigation District, for whose water system $2,000,000 in bonds has been voted.

WASHINGTON

INDIANS REFUSE TO SELL.

The reclamation of 120,000 acres of land on the Yakima Indian reservation under the Wapato project is to be delayed indefinitely because the Indians refuse to sell their land as provided by the Jones act. The Reclamation Service has completed all the preliminary work and is now ready to begin actual construction on the canals and laterals, but nothing can be done because the Indians refuse to comply with the law. Of the 120,000 acres of irrigable land under the project, only about 10,000 acres are in the hands of the whites, having been sold under Indian heirships. This leaves 110,000 acres still in the hands of the Indians. While the exact amount that must be signed up will be fixed by proclamation of the secretary of the interior, yet it is well understood that this amount must be the greater portion of that to be irrigated.

Michael Earles, president of the Hanford Irrigation & Power Company, in which Seattle capital is heavily interested, recently closed a deal for the purchase of 11,000 acres of land from the Northern Pacific Railway Company in Benton county, eastern Washington. The deal means that the present electric power and pumping system of the Hanford company, in which $750,000 is inter-

ested, will be extended at once, new electric generating machines installed and a big body of fertile land on the west bank of the Columbia river reclaimed.

Upon promise that the Pasco Water & Power Company will be reorganized and that water will be turned into their lands without unreasonable delay, land owners in the Two Rivers Irrigation district, Washington, have formed a water users' association. Officers are as follows: President, S. B. L. Penrose, of Whitman College, president; G. W. Chute, vice-president; Laura A. Richart, secretary; W. C. True, treasurer.

Under the public land laws, the Secretary of the Interior has withdrawn from any form of disposition whatever the following described lands for use as a reservoir site in connection with the Yakima Irrigation project, Washington: T. 17 N., R. 12 E., all Secs. 12, 13, 14, 21, 22, 23, 24, 26, 27, 28, 29, 32 and 33 (unsurveyed); T. 17 N. R. 13 E., all Secs. 7, 8, 17, 18 and 19.

These lands are situated within the Mt. Ranier National Forest.

The Director of the Reclamation Service has suspended the contract with the Standard Building Company of San Francisco, California, for the construction of the Sulphur Creek Wasteway in connection with the Sunnyside Irrigation project, Washington. The company ceased work, gave a bill of sale for the machinery, and attempted to move the same from the ground, in direct violation of the terms of the contract.

Reports from Wallula, Wash., state that the Klickitat Irrigation Company, organized about five years ago, has resumed activities and engineers are now making surveys to reclaim lands in the Horse Heaven district.

G. W. Armstrong, manager for the Wahluke, Wash., irrigation project, has let contracts for work designed to reclaim 15.000 acres in this district. There will be about twenty-three miles of canal. Water will be pumped from the Columbia river.

Ranchers in the vicinity of Quincy, Wash., have secured the co-operation of the local commercial club in an effort to invite inspection of irrigation experts with a view to construction work that will reclaim a large acreage in this section.

CALIFORNIA

VICTOR DAM BEGUN.

Surveys for the preliminary work on the Victor dam site at the Narrows of the Mojave River have been started by the Mojave River Development Company, a recently organized company of San Francisco and eastern capitalists. The dam site is at a point near Victorville, Cal., where the Mojave flows through a narrow pass in a range of hills and on either side solid walls of rock rising for several hundred feet. Thousands of acres of rich land on the desert side of the San Bernardino Mountains will be brought under cultivation.

The Amercian Canyon Water Company, with valuable rights on the American River, has filed a trust deed at Sacramento, Cal., to the First Federal Trust Company of San Francisco. The former company recently acquired the North Fork ditch from the North Fork Ditch Company. It is proposed to supply water to Orangeville Bluffs, Fair Oaks ond other districts in this section of the Sacramento Valley.

The Santa Ana Valley Irrigation Company of Santa Ana has received a report from Engineer J. B. Lippincott of Los Angeles concerning proposed water development plans in the Santa Ana Canon. On August 7 a meeting of stockholders was held to consider the raising of the capital stock of the company from $100,000 to $500,000 to enable the company to raise money to carry on the work of water development.

Articles of incorporation of the Sacramento Valley West Side Canal Company were filed in San Francisco recently. The company is formed for the purpose of "supplying stockholders with water for irrigation and domestic purposes." The incorporators are: Fentress Hill, San Francisco; D. W. Ross, Piedmont; J. L. Slater, Berkeley, and J. H. Simpson, Jerome Hill, Jr., W. B. McCain, W. S. Kuhn, J. H. Purdy and J. B. Van Wagener, all of Pittsburg, Pa. The corporation is capitalized at $250,000. S. H. Gilmore of Pittsburg is the attorney for the company.

A. M. Fairchild of Los Angeles and other southern California capitalists have in contemplation the establishment of an immense irrigation and power enterprise for Lake, Yolo and Solano counties, California.

The project is to make a reservoir of Coyote Valley, to be used to irrigate lands in Yolo and Solano, in the vicinity of Winters and Davis.

ARIZONA

COLORADO RIVER HIGH.

The Colorado River has risen steadily and the discharge at Yuma, Ariz., recently amounted to 150,000 second-feet, which is the largest recorded in the history of Colorado discharges. Laguna dam, recently completed by the Reclamation Service, in connection with the Yuma irrigation project, which is passing through its first flood, and the forty miles of levee lying below that structure, are standing the test extremely well. The levee system, it is believed, will be able to successfully resist a flood very much higher than the one now passing. About 150 men are employed in the vicinity of the dam and in excavating the main canal. The product of the steam shovel is used in blanketing the levees and in strengthening the shore near the dam. The Farmers' Pump has operated continuously during June, and the ditches connected with the Scoop Wheel have run most of the time, the supply being gravity flow.

Engineers of the Reclamation Service will prepare farm unit plats of the Yuma irrigation project, Arizona-California, based upon the proposition that 40 acres of average land on the project is sufficient for the support of a family. This is subject to diminution in the neighborhood of towns and elsewhere, when by reason of market conditions and special fitness of the soil, for the growth of fruit and market produce, a lesser area than 40 acres may be sufficient. In such cases the minimum acreage of the farm unit may be as low as ten acres.

During June the contractors laid 14,000 cubic yards of masonry on the Roosevelt dam, Salt River irrigation project, Arizona. The masonry was all laid on the south side of the gap through which the water is still flowing from the reservoir. The south end of this part of the dam is at an elevation of 169 feet. Near the gap the elevation is 135 feet. The water in the reservoir is 110 feet deep. The Government cement mill was operated 25 days, burning 11,500 barrels and grinding 12,000 barrels of cement. The south canal is completed and work is being pushed on the eastern canal. Work is progressing favorably in concreting the sluicing tunnel.

Contract has been awarded to William B. Pollock & Co., of Youngstown, Ohio, for furnishing ten-foot penstock for the power house at Roosevelt dam, Salt River irrigation project, Arizona. The cost to the Government will be about $6,500.

Send $2.50 for The Irrigation Age, one year, and the Primer of Irrigation, a 260-page finely illustrated work for new beginners in irrigation.

IDAHO

TO USE OLD CANALS.

The Secretary of the Interior has approved a contract entered into by F. E. Weymouth on behalf of the United States, with the Nampa-Meridian Irrigation District and the Payette-Boise Water Users' Association, which provides for the use by the Government of the canals and laterals of the Nampa-Meridian Irrigation District, in the reclamation of certain lands belonging to the Payette-Boise project, Idaho, and for the adjustment of expenses of operation and maintenance of the canals and laterals between the respective parties. The United States is given the right to enlarge or extend the existing canals or laterals of the Nampa-Meridian Irrigation District, the title to all enlargements or extensions to vest in the United States.

The lands involved consist of about 50,000 acres, lying within the boundaries of the above named irrigation district and below their canal. It was deemed inadvisable for the United States to construct new canals and laterals to irrigate these lands when the work could be done more cheaply by utilizing the canals and laterals of the district.

It is reported that the J. G. White Company and the Kuhn interests are contemplating operations on the Dubois project in Fremont County, Idaho. This is a tract of about 300,000 acres of Snake River Valley land lying north of Idaho Falls. A few years ago the United States Reclamation Service withdrew it from entry and made preliminary investigations, but finally restored the land to entry, because the cost was too great. It is estimated that from three to five million dollars will be required to complete the project.

Nearly 5,000 acres of Idaho state land, most of which lies under the pumping system of the Minidoka irrigation project, have been sold at public auction by the State at an average price of $27 per acre, although some tracts selling as high as $70 per acre. Preparations are under way for the early construction of the superstructure of the power plant and pumping stations, which at present are protected by temporary frame coverings.

Delivery of water through the pumps during June has been intermittent, owing to several slight alterations in the new machinery, but the flow from Marsh Creek has been diverted into the canals. Water has been supplied to a number of the south side settlers and an increasing number of farm units are being watered as the laterals are completed. The gravity system has supplied water without interruption.

Irrigation by pumping is to be tried on an extensive scale by the Crane Falls Power and Irrigation Company on the Snake River, west of Mountain Home, Idaho. The company will construct a power plant to reclaim about 8,000 acres of sage brush land, to which water can be lifted in no other way. The Snake River is about 200 feet lower than the land and the water will be elevated in three sections.

Boise capital is said to be interested in a new irrigation project near the town of Bruneau, adjacent to the Twin Falls-Bruneau segregation. About 15,000 acres may be placed under water. Surveys are now being made with a prospect that work will be begun this fall.

Construction work is now being actively pursued on the Big Lost River irrigation project, which will reclaim 80,000 acres of fine land south and east of Arco. This land lies about fifty miles northwest of Blackfoot and is reached by the Salmon River branch of the Oregon Short Line Railroad.

Articles of incorporation have been filed at Caldwell for the North Side Irrigation Company. The incorporators are: G. D. Snell, E. A. Clark, S. S. Foote, B. M. Holt, J. B. Gowen, Fred E. Fisk and Frank J. Smith. The capital of the company is $100,000 of the par value of $100 each. If the government relinquishes the north side of the Payette-Boise project, this company will be prepared to promote it with private capital.

UTAH

CAPITALIZE NEW COMPANY.

Land owners in Davis, Weber, Morgan and Summit counties, Utah, are planning the formation of a company to construct a comprehensive irrigation system to reclaim arid and semi-arid lands in this section of the state. It is said that the new company will be capitalized at about $4,000,000 and that preliminary negotiations for the sale of bonds have been closed.

Several years ago a local company was organized, but after the expenditure of about $25,000 it was found that the capital was entirely inadequate to needs. It is only after five years of effort to interest outside capital that the company's promoters have been successful.

About 50,000 acres of land, a larger part of which is arid, is involved in the work. The old Weber Reservoir, Power and Irrigation Company, now holding valuable rights and plans, will be merged into the new corporation. The directors of this concern are: W. H. Rich of Morgan, president and director; G. Christensen of Ogden, vice-president and director; Thomas L. Allen of Coalville, secretary-treasurer and director; John G. M. Barnes of Kaysville, director; James Green of Hooper, director; Heber J. Sheffield of Kaysville, director; Nephi Sargent of Hoytsville, director; Joseph H. Grant of Wood's Cross, director.

Water will be stored above Echo, and as needed, will be conveyed into the river channel to a point above Peterson, Morgan County, where a dam will be built and from which point two canals, one on the south side of the river to water Davis County lands, and one on the north side to irrigate Weber County farms, will be constructed. They will follow the line of the Union Pacific track through Weber Canyon into Salt Lake Valley. At the mouth of the canyon the canal will be 340 feet above the river bed, this elevation being sufficient to cover practically all tillable lands in Davis and Weber counties. In all, something like fifty miles of main canal will be required.

WYOMING

FLOODS IN THE NORTH PLATTE.

Mr. A. P. Davis, chief engineer of the Reclamation Service, who has recently visited the Pathfinder dam in central Wyoming, reports that the extraordinary floods have necessitated the rapid construction of a dike across a low point on the side of the reservoir, left open to prevent the flooding of certain lands in the basin, the acquisition of which has not been completed.

The floods in the drainage of the North Platte River this year are far in excess of any previously recorded. Although all the gates and openings in the recently finished Pathfinder dam are kept wide open the inflow has been more than double the discharge. According to all precedents the flood should cease rapidly, but in view of the fact that this is an abnormal year, extraordinary precautions are being taken to prevent the escape of water from the low point in the reservoir. The engineers are

carefully noting every change and are watching the rise, so that if it should gradually approach the top of the dike now being built, a safety or relief tunnel can be quickly blasted out sufficient to take care of the extra discharge. It is not believed, however, that it will be necessary to resort to such an expediency.

E. C. Grable of Greeley, Colo.; F. O. Wendelken of Ft. Collins, Colo.; and E. J. Bell and C. P. Arnold of Laramie, have incorporated the Interstate Reservoir Construction Company, with a capital of $500,000, to build a reservoir with a capacity of 80,000-acre feet and reclaim 40,000 acres of land in Natural Basin, eighteen miles west of Laramie. The company will build a reservoir and construct canals and ditches costing $497,000.

OREGON

NEW GOVERNMENT PROJECT.

A. P. Davis and D. C. Heney, engineers for the Reclamation Service, are reported to be making surveys and otherwise investigating conditions west of the Umatilla and south of the Columbia rivers in Umatilla and Morrow counties, Oregon, wtih a view to construction work for the reclamation of about 70,000 acres. It is proposed to construct a dam across the Umatilla river near the mouth of Butter creek. An obstacle to this work is found in the present lands which must be flooded, some being under cultivation.

J. T. Whistler, formerly with the Reclamation Service, has been making investigations and surveys at the junction of the McKenzie and Willamette rivers near Eugene, Ore., with a view to the formation of an irrigation company to develop this project.

Reports from Baker City, Ore., state that Avans Almirall, of New York, and O. C. Finkelnburg, of Baker City, are financing a project about thirty miles northeast of that city on the Thief River. It is proposed to carry canals across to Richland. The same company is planning another dam on Balm creek, about twenty-five miles northeast of Baker City.

After considerable litigation the Deschutes Irrigation & Power Company, of Salem, Ore., is in a position to open an irrigated tract of 2,300 acres to settlement. Land lies in the Deschutes Valley.

Farmers' unions of Crook County, Ore., meeting at Madras in that county, have presented a formal request to the government to investigate conditions with a view to reclaiming about 250,000 acres in and near Crook County. It is claimed that the rainfall is so irregular that many homes must be abandoned unless an extensive irrigation system is constructed.

NEW MEXICO

GOOD HEAD IN RIO GRANDE.

The weather conditions on the Carlsbad and Hondo projects, New Mexico, have been rather dry, although local showers on the Carlsbad have relieved the situation and the crops are improving.

There has been a strong flow of water in the Rio Grande during the month and the main canal of the Leasburg Unit has been carrying about 400 second-feet. The river has averaged 7,000 second-feet and all farmers depending upon it, both the Leasburg Unit and private canal owners, have been amply supplied.

The second cutting of alfalfa is finished and a splendid crop was secured. The cantaloupe industry, which is a very improtant one under this project, has a fine outlook for the season.

Farm unit surveys are progressing rapidly and a party will soon be put on the El Paso Division. The work at Engle Dam site consists in testing improved devices for removing material from the river bed.

HERE AND THERE

The Toyak Lake Irrigation Company, with head offices at Temple, Texas, has recently been organized for the irrigation of a large tract of land in Reeves County. The company's stock is held by local parties and Granville Sims is president.

By order of the court, the receiver of the Houston Land and Irrigation Company, Houston, Texas, will receive bids for the entire real estate holdings of this concern, said to aggregate in value about $300,000.

R. M. Quigley of the Kenefick, Quigley & Russell Construction Company, Kansas City, claims contracts for construction work for the Lake Hattie Reservoir and Irrigation Company on the Big Laramie River in Wyoming, and for the Bar Lake Irrigation Company, near Denver. The former work will involve the reclamation of about 50,000 acres.

It is announced that a syndicate of Denver capitalists has purchased the Eureka canal in Ford County, Kansas, for a consideration of $250,000. Improvements involving large sums are outlined with a view to the irrigation of about 50,000 acres.

Seattle capitalists are said to be backing a project for the construction of a dam and canal to carry water from Massacre, West and Middle Lakes, in northwestern Nevada to irrigable lands in Washoe vounty. It is reported that about $300,000 will be expended in the construction work.

Reports from Mexico City state that the Mexican government has arranged to loan $3,000,000 to Manuel Cuesto Gallardo for the construction of a dam across the Puero River at its entrance to Lake Chapala and the building of laterals and canals to reclaim about 150,000 acres.

About 60,000 cubic yards of earth were placed in the big dam, Belle Fourche irrigation project, South Dakota, during June, making a total yardage to date of 1,137,000. Paving blocks are being placed on the water slope and 1,000 cubic yards of gravel were placed. Owing to a heavy rainfall early in June, little irrigation was required. About thirty filings were made on land under the project, mostly on forty-acre tracts around the townsite.

The Sinaloa Land Company, a California organization, is now working on an irrigation system that will supply water to about 75,000 acres of land in the valley of the Culiacan River, near Mazatlan, Mexico. The main irrigation canal will be fifteen miles long, and there will be many miles of lateral ditches.

Citizens of Townsend, Mont., are preparing data to be presented to the Reclamation Service and the senate committee on reclamation, concerning the reclaiming of a large body of land. The plan looks to the building of a high-line ditch, running close to the foothills, from above Toston to the neighborhood of Canyon Ferry, the water to be taken from the Missouri, which will reclaim 40,000 acres of government land and about the same quantity in private ownership.

$2.50 Will pay for the IRRIGATION AGE one year and the PRIMER OF IRRIGATION.

ALASKA-YUKON-PACIFIC EXPOSITION.

The Alaska-Yukon-Pacific Exposition, now in progress at Seattle, Wash., is not the largest of expositions. Comprehensive and extensive as it is, the assertion is not advanced for the fair that, like some of the Northwest's strikingly beautiful flowers, will blossom respendently until the middle of October. But it is to be the most beautiful. The thing of all things that has lifted the Alaska-Yukon-Pacific Exposition above its predecessors is the fact that its natural advantages have never been equaled. Towering even above the loftiest structures are the trees of Washington's famous forests, and everywhere a skyline of beautiful firs, typical of the rugged spirit of the west, makes a picture unique in the gallery of exposition masterpieces. To the east the Cascade Mountains, through whose beauties thousands must travel to reach their destination, are just far enough away to display their snow-clad beauty in soft outlines and picturesque contour. To the east the jagged Olympics, rock-buttressed against the sea, thrust inaccessible peaks abruptly into a sky that at sunset is as truly glorious as any in the world. Rainier, a sublime mountain that because of its 15,000 feet in height, is a byword wherever geography is a study, and Mounts Baker and St. Helena, two other stately peaks, seen almost within walking distance, when, as a matter of fact, they are many miles away.

Lakes Washington and Union are beautiful boundaries for the grounds, and Puget Sound, far-famed as one of the world's most important highways of commerce and most beautiful bodies of water, intervenes to make the distant Olympics more magnificent. Stretching for miles from the exposition gates is the great City of Seattle, with a population of 300,000 and a throbbing pulse of almost feverish activity.

To the great mass of its visitors, the Alaska-Yukon-Pacific exposition will be an excursion into lands unknown. As its three-part title would indicate, its purpose is to exploit the Northland and the states and countries bordering on the great ocean which seems destined to replace the Atlantic as the theater of the events which make up the scenario of the drama of world politics. Here, where the personification of culture and progress, as represented in the art of formal exposition buildings and gardens, is strangely set down in an almost primeval forest, mingle the oldest and newest civilization. The far Occident and the far Orient are bartering learning as well as goods, and many religions, philosophies, cults and isms

(Continued on page 383.)

View from Government Building, Mt. Ranier in the Background.

LAND OF TAOS

Secret of Wonderful Richness of Taos Valley Soil—Earth Has Been Storehouse for Ages—Ranchos Orchard & Land Company Rushing Irrigation Works—Great Influx of Settlers—Taos Indians Plan Annual Festival.

Experts in geology, dispatched by the government to study into conditions and determine the reasons for the marvelous fertility of certain crudely irrigated sections of northern New Mexico, have declared in their official findings that in prehistoric times this entire territory was probably an immense lake. Seismic disturbances, tornadoes and volcanic eruptions, submerged masses of tangled verdure—the flotsam and jetsam of the countless ages following creation—and for centuries held decaying vegetation at the bottom of this gigantic inland sea.

The world changed. Slowly the waters receded from their playgrounds of centuries. Huge masses of rock towered over the dying sea. Impervious to heat, they watched the waters still further recede until only turbulent rushing streams coursed their sinuous ways across the lands while the sun, constant and relentless, dried mesa and valley into brown unproductive earth.

Today, after the rise and fall of at least two empires, the relics of which are yet in evidence, the earth has lost but a fraction of its legacy of richness from the long ago. Science and industry are reclaiming these arid lands. Soil has retained its plant foods for thousands of years and today wherever the earth is given drink it offers up its thanks in bounteous crops.

Taos valley in old New Mexico promises much to the invading white men. In splendor of scenery, historic interest and lastly, fertility of soil, it is unsurpassed by any section of this great southwest. Even as it gave homes to the most advanced type of aborigines, so must it give lust and strength of mind and body to its new inhabitants. Its lofty mountains, its sunny weather and its smiling fields must reflect upon its peoples through hundreds of years to come a sunny temperament, a thrift and a peace of mind that bodes naught but wealth and longevity.

In connection with the Taos valley it may be stated that Ranchos Orchard & Land Company, having within its grant a section embracing about 15,000 acres of the finest mesa land, has undertaken and is rapidly bringing to maturity a great irrigation project. About 2,500 acres are already under water. Within the next twelvemonth this acreage will be doubled.

Attracted by the glowing accounts of crops and the aggressive policy of the Ranchos Ochard & Land Company is preparing new acreage for culture, there has, during the past two months, been an enormous influx of homeseekers to this section. Drawn by the veracious reports of sunny weather, little extreme of heat or cold, and prospects of bumper yields of beets, alfalfa, grains and fruits, tourists and settlers from the east have surmounted the difficulties in reaching the Taos valley and almost without variance have quickly invested in lands.

View of Pueblo River, Near Ranchos, Taos Valley, New Mexico.

Pastoral Scene, Ranchos, N. M.

Manager Joe B. Warner is most optimistic over the outlook both for this year's crops and for sale of lands. He states that the orchards, although many are but a year or two years old, give promise of early maturity and abundant yield. Attracted by the climatic conditions, fertile soil and the records of yielding orchards, numerous experienced pomologists have purchased land and are now actively in the field, planting and arranging for fruit culture on an extensive scale. Inexperienced settlers receive the benefit of scientific knowledge and great interest has thereby been awakened in orchard culture.

(Continued on page 385.)

ATTALIA, WASHINGTON
On the Columbia

One-Year-Old Orchards Show Phenomenal Growth—Alfalfa Crops Are Heavy—Columbia Canal Company Will Make Extensive Improvements—Dahlhjelm & Rowell Company Reports Large Sales of Ten-Acre Tracts—New Electric Line Promised.

The remarkable growth made in the orchards which were set out during the past year at Attalia has established all claims made by the promoters. One needs only to visit the orchards owned by C. A. Skoog, W. I. Ingraham, J. H. Scherry, Sylvester Linn, Columbia Fruit Farm and others, to see what can be done when modern methods are applied. Mr. Skoog came to Attalia in November, 1908, but did not improve his land until late in the spring. He planted about two-thirds to apples, pears and grapes, with peach fillers. The balance was seeded to alfalfa. Between the trees he planted potatoes, and by the 10th of June had new potatoes large enough for shipment.

C. O. Peterson in May cut nearly four tons of alfalfa to the acre, on ground seeded late in the season of 1908, selling the hay for $12 a ton in the field. Four cuttings are made each year, and the last growth used for pasture.

S. Linn cut asparagus early in March, which he sold at 30 cents a pound. Asparagus will yield an average of 2,000 pounds to the acre.

The results derived at Attalia are only a repetition of what has been done in older districts. The soil is identical—a rich volcanic ash, which needs but the water to make the desert "blossom like the rose."

With a large portion of the valley already sold in five and ten-acre tracts, which must be improved within one year, this valley will develop faster than any project in the West. The Columbia Canal Company will make extensive improvements this fall, both in the townsite and on unsold lands. Realizing that the demands for improved plants at Attalia will exceed the supply, they will improve several hundred acres. This will not only enhance the value of the lands improved, but will increase the price on all adjoining lands.

Through the extensive operation over the entire United States by the Dahlhjelm & Rowell Company and the Dahlhjelm Company, Attalia has become known as one of the great fruit districts of the West. Through their advertising campaign, they have let the people of the world know what they have, and having told their story, they invite people to investigate for themselves, and when they have done this they all say, "We find more than we expected."

The development of a valley such as Attalia means much to the whole United States. The promoters may well be proud of their accomplishments, and the people who settle there owe them a debt of gratitude. Places of this kind cannot be advertised too extensively. So few people, especially in the Middle West and East realize the enormous profits which are being derived from Washington fruit lands.

It is very evident that Attalia will have at least one electric line within one year, this in addition to the Northern Pacific, O. R. & N., North Bank, Canadian Pacific, Northcoast, and river transportation, all the year, gives Attalia a distinct advantage over all other districts. It will not only give the grower the benefit of low freight rates, but will make Attalia the distributing point for southern Washington and northwestern Oregon.

It is seldom that one finds all the advantages necessary to the production of good fruit and profitable orcharding centered in one community, as they are at Attalia. First, soil; second, water; third, climate; fourth, early season; fifth, drainage, both water and air; sixth, transportation facilities and markets. Attalia is so situated that the products can be placed on the train in the evening, travel through the cool of the night and be delivered in Seattle, Tacoma, Portland, Spokane and intermediate points early the next morning. Eastern shipments can go over three roads and be delivered in all principal cities without transfer.

The Scherry Ranch, Where $75.00 an Acre Was Produced the First Year Under Cultivation.

Send $2.50 for The Irrigation Age 1 year, and the Primer of Irrigation

BLUEWATER VALLEY
NEW MEXICO

Irrigation Engineer Reports on Fertility of Lands—Soil Deeply Charged with Mineral Elements—Capable of Producing Nearly Any Crop—Building Stone Near by.

Reports of irrigation engineers who have investigated conditions in the Bluewater Valley have recently been made public and are of a character to encourage the investigation of all western irrigated land seekers. In view of the favorable nature of these reports and because of the prominence of the engineers who have made investigations, the following excerpts are reproduced. In connection with his report upon this land, Richard J. Hinton, member of the A. S. I. E., says:

"As to the fertility and adaptability of the soils and lands, under the Bluewater system, I have no hesitancy in expressing an entire approval. As it lays out of doors, I have seldom seen 25,000 acres so perfectly adapted to irrigation as these. About one-half the acres—the western section—consists of the famous red loam so eagerly sought after in our region. It is charged with mineral elements, deep, warm, easily worked and retentive of moisture. This is largely the product of volcanic rocks. There is a distinct division between it and the lower, or gray limestone made lands.

"The latter are excellent vegetable, grape, small fruit and forage lands. Both soil divisions are tractable, deep and readily watered and drained. The surface loam or deposits are from 15 to 30 feet in depth. Beneath the tufa or volcanic soil there is at about forty feet a volcanic hard pan.

"The limestone soils are underlaid with gravel and hard strata. Drainage water for well use can be obtained in the volcanic or red soils at from thirty to forty feet. The subplane waters are about the same depth in the lime rock soils (admirably adapted for alfalfa). In short, these soils will produce abundantly all the crops of the temperate zone. This will be found to be an excellent sugar beet section. All root crops as well as grain, forage and leguminous products will thrive abundantly. The natural grasses are of the best. The range and foot hills furnish wild fruits, gooseberries, raspberries, Rocky Mountain cherries, plums, etc., in abundance. High altitude timber is ample for years to come—scrub oak, cedar, mesquite, pinion or scrub pine. Coal has been found within six miles. Mineral float has been found. Pine timber is near by. Fine limestone rock furnishes the kiln men, and there are works in operation producing about 90 or 95 per cent pure lime. I noticed excellent building stone also."

NEW UTAH PROJECT.

Newspaper reports from Ogden state that Samuel Newhouse of Salt Lake and several New York associates are planning construction work in Weber Canyon near that city, to reclaim about 20,000 acres. It is asserted that Mr. Newhouse purchased rights in this district, and that John Montgomery, of New York, recently made a personal investigation of the situation. J. L. Reynolds, secretary of the Weber Club, and local business men are said to have conferred with Mr. Montgomery.

FRANK G. CARPENTER RETURNS.

Frank G. Carpenter, whose letters from foreign points have probably been read more widely than any previous writings on travel, has recently returned from the far east and is now at Washington, D. C. In the course of his travels Mr. Carpenter has given valuable and reliable information relating to the ancient methods of irrigation.

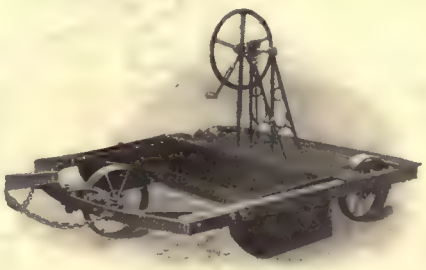
In may not be generally known that Reid Carpenter, secretary and treasurer of the Humphryes Manufacturing Company, makers of hand and power pumps at Mansfield, Ohio, is a brother of the famous writer. Those who are familiar with the progress of this company recognize in Mr. Reid Carpenter those traits of character that have already brought eminent success to his brother in the newspaper field. Mr. Reid Carpenter is now in Washington, D. C., for a visit with his brother after a separation of many months.

SHUART GRADING MACHINE.

Never in history has there been such interest displayed in irrigation as at the present time. Enormous sums of money are being expended and every available means is being put into effect in order that the vast amount of otherwise unproductive lands might be converted into crop-producing and thereby money-earning farms.

Eastern wage earners and home seekers, look to the West and its wonderful opportunities as a source from which to derive a living and further assist nature in reclaiming her own.

The Seventeenth National Irrigation Congress, to be held in Spokane this month, has for its object the advancement of methods for practical and economical irrigation of arid lands and as a basis for this work, the initial preparation of the soil must be considered. It is an unquestionable fact that in order to give the best results throughout, the land must be leveled and to accomplish this, the most modern tools should be used. The Shuart Grader, shown here, is a machine which has been used for this work for a great many years and is recommended by the United States Government Experiment farms for grading preparatory to irrigation.



The advertisement of the company manufacturing this machine and others for like purposes, appears elsewhere in this paper. The company will gladly furnish inquirers with all information desired about their product and also about land preparation.

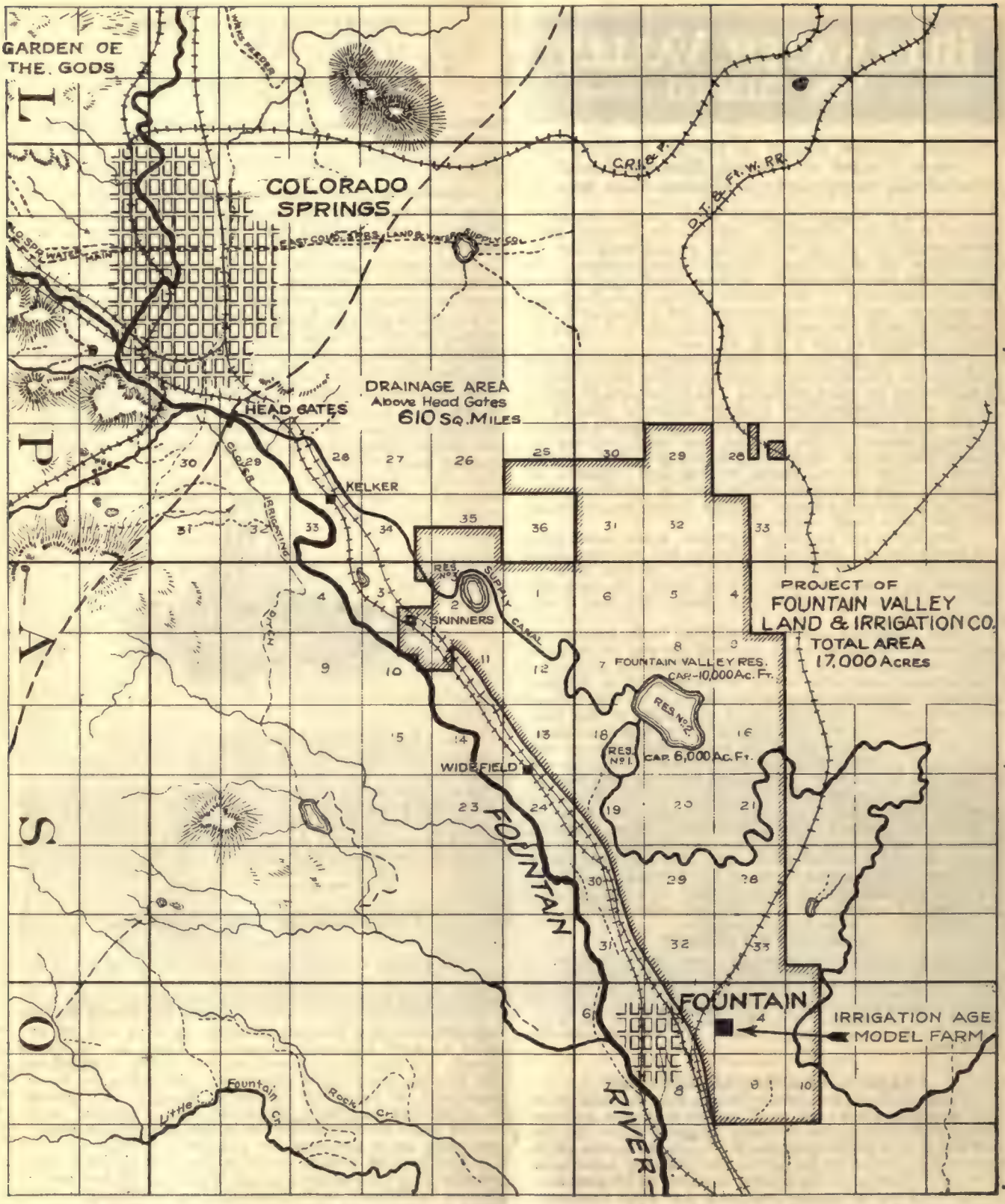
Those interested in practical irrigation should refer to the manufacturer's announcement in regard to the Shuart Grader and write for catalog and other literature.

CONGRESS OF DRY FARMERS.

The Fourth Dry Farming Congress will hold its meeting at Billings, Mont., October 26, 27 and 28, 1909. This will not only be an institute for dry farming farmers and dry farming instructors and teachers, but it will be an exposition of dry farming products such as this or no other country has ever witnessed. There are pledged already exhibits from thirteen western states engaged in dry farming work. The organization by states, to show what each is doing and capable of doing in the raising of grain and vegetable crops, without irrigation, is a feature never before undertaken in this district, and promises some great surprises for visitors.

The area of tillable lands in the United States not yet turned to cultivation is comparatively small, and under present conditions of demand by the homesteader will last but a few more years at most. It is only the part of good business judgment that the dry farming districts be investigated by those who contemplate getting a home under the free homestead law. Good lands and the best locations will be the first taken. Each year will reduce the quality of lands to be disposed of as government homesteads.

It is announced that there are 200,000,000 acres of arable land awaiting development by dry farming methods.



OUR EXPERIMENTAL FARM—FOUNTAIN, COLORADO.

We are showing again map indicating location of THE IRRIGATION AGE model farm near Fountain, Colorado, which was established and work started in May of this year. Forty-eight acres have been leveled and put under the plow this season. The full forty-eight acres were sowed to oats and alfalfa. It is our intention to plant several hundred fruit trees in the spring of 1910. During the next month work will begin on a cement block house and barn. It is not our intention to exploit work performed until crops are matured and the place is equipped with farm implements. The editor will visit the farm this month and plan future work. This land was purchased from the Fountain Land & Irrigation Company of Colorado Springs, Colorado, through its selling agents in Chicago, the Pearsons-Wilhite Company, 181 La Salle street. Mr. Wilhite of that company will supply any information desired concerning this tract or adjacent districts in Colorado.

ENTERPRISE TENT-COT

Apropos of the somewhat hysterical but, nevertheless, commendable agitation for outdoor sleeping as a result of experiments and theories as to the scientific cause and treatment of the great white plague, comes the announcement, in advertising columns, of the invention and manufacture of a tent-cot seeming suitable for outdoor needs and admirably adapted for the cure of pulmonary troubles without the usual discomfiture and annoyance incident to sleeping in the open air.

After a series of experiments the Enterprise Bed Company, of Hammond, Ind., has evolved and patented a tent-cot that is already bringing large orders to its factory. Realizing its values, proprietors of sanitariums and hospitals have placed a sufficient number of orders to prove that the product is of unquestionable merit.

In accompanying cuts are shown the various uses to which the tent-cot may be adapted. Campers and fishermen find it to be of value because of the ease with which it is packed, ready for portage or shipment, and the small space required in camping outfits. Although complete in all details the cot when folded weighs but thirty pounds and can, therefore, be easily carried under the arm for long distances if necessary.

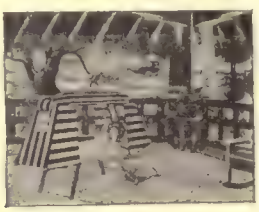
The frame of the Enterprise tent-cot is of hard maple with substantial roof work and legs properly braced to withstand storm or wind. Strong 10-ounce brown duck covers the sides, while the top or canopy is of 8-ounce material. Windows at each end are 9x12 inches with flaps for storms, and mosquito netting to exclude flies and other insects. Side doors are of sufficient size to allow easy entrance or egress and are provided with similar flaps and netting. In structure the tent-cot is of the collapsible style and for this reason parts cannot be lost or become separated during either a long or a short shipment.

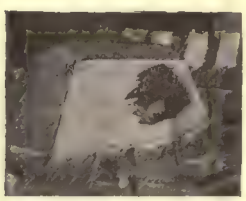
For hunters or fishermen the tent-cot possesses many advantages. With but a moment's work it can be set in place and made ready for use. Inasmuch as there are apertures at all sides and the entire structure can be shifted without effort; it can easily be turned in any direction desired, to avoid sunshine or to enjoy the cool breezes. Flies, snakes, animals and insects are barred from its interior and the tired camper may lay himself down to peaceful dreams, secure in the knowledge that creepers and crawlers may not interrupt.

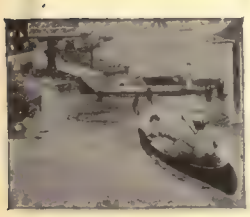
Although light in weight and boarded with canvas, yet no wind or storm may find the sleeper unprepared. Without rising from his position, he may raise or lower the flaps at will. Walls and canopy are of an especially prepared canvas through which water or sleet cannot penetrate. A pillow and a couple of blankets allow a comfortable night's sleep, even during cold weather.

Since the Enterprise tent-cot was first placed on the market, the public has grasped eagerly at the opportunity to get a durable, comfortable outdoor bed at a nominal cost. Representatives of the company state that while the majority of orders are from physicians and residents of the city who wish to use the tent-cot for sleeping on verandas or lawns, yet a large number of inquiries are received from miners, prospectors, engineers and travelers who are forced into outdoor life and who find that the tent-cot is necessary to their work.

The elevation of the sleeping cot above the ground, its comfortable head rest, the protection from flies, mosquitoes and all creeping things, the elimination of the bothersome pegging process, the ease and rapidity with which it may be erected and lowered, the absence of all annoying "parts" or fixtures, its remarkably light weight and strength of construction, and lastly its reasonableness in price—all prove that the Enterprise tent-cot is not a toy, but it is an eminently practical and satisfactory solution of a long-mooted problem.





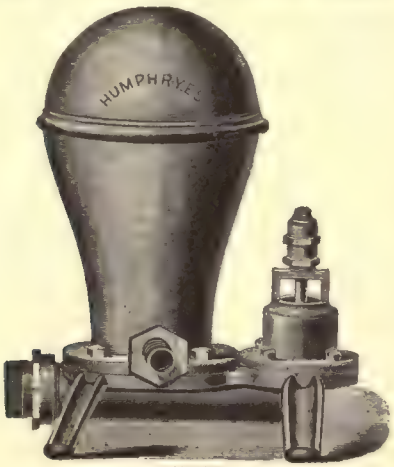


Here's one unoccupied. In the lower corner of the cut you see it as it looks when folded.

(Continued from page 370.)

all conditions; and very high in efficiency, the same being from 40 per cent to 60 per cent greater than can possibly be attained by any other machine, or any two machines, such as a water motor and pump combined. The simplicity of construction is an absolutely essential feature in cases where the user is not an experienced mechanic; also the noiselessness of operation.

The uses of a hydraulic ram are various. The vast



H 685

Hydraulic Ram, Made by Humphrey Mfg. Co., Mansfield, Ohio.

field of irrigation is commanded by this machine. It will utilize nature's forces in a faithful manner, working day and night in hot and cold weather, without any attention bestowed upon it, and with no cost of maintenance or of operation, and can scarcely be appreciated. Irrigation by this simple means, will greatly increase the possibilities of farming on arid and semi-arid lands heretofore dependent upon the government or corporations. Costly ditches, carried over miles of country, with their attendant inconveniences, arising from rights of way, cost of maintenance, conflicting claims, and other difficulties, can be dispensed with.

Wherever there is water flowing and a fall of two feet or more can be secured by ditching, damming or the like, the adjacent country can be converted into highly productive farms.

The Humphreys Manufacturing Company of Mansfield, Ohio, has recently published a booklet, entitled "Domestic Water Supplies," which embraces hydraulic rams and pneumatic water supply systems, with tables and information in detail concerning their various forms and uses. Among the many comforts which have stimulated interest in farm life, are the adequate and improved domestic water supply systems which have recently been perfected. At the present moment the isolated home, by the use of a water system, can be made as comfortable as a city residence, connected with a highly improved city water system. It is entirely practicable for the farmer to enjoy the most complete sanitary appliances, and a complete bath room equipment connected to a heating apparatus.

MYERS' NEW CATALOG.

"Our trade is rushing," said a representative of F. E. Myers & Bro., recently in speaking of business conditions at the factory in Ashland, Ohio. "During the late financial stringency our factory operated at full force and on full time. Our output since last harvest exceeds that of any other year."

In pursuance of its aggressive policy to build up its trade throughout the United States, Myers & Bro. have recently issued a new pump, hay-tool and easy door hanger catalog to which there is no superior on the market. This catalog, known as No. 47, contains much interesting information about the goods handled by the company and is of particular value to owners of western irrigated lands, who are interested in water lifting or pumping machinery.

UNITED STATES
LAND AND IRRIGATION
EXPOSITION

Coliseum, Chicago, Nov. 20 to Dec. 4, 1909

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United States Land & Irrigation Exposition

115 Adams Street, CHICAGO

(Continued from page 371.)

the net profit of the grower. The warmth of the valley makes it an ideal peach-growing country, and apricots, prunes, cherries and other fancy crops bring gratifying financial returns.

Settlers on the Uncompahgre project will have no difficulty marketing their crops, as the Denver & Rio Grande Railroad traverses the entire valley. Last year the Montrose ranchers, through their local association, shipped 288 cars apples, 10 cars peaches, 10 cars of mixed fruits, such as apricots, cherries, grapes, ets., and 400 cars of potatoes. Besides this, a large portion of the crop was hauled in wagons to nearby mining camps and sold at a high price. Most of the ranches in the valley are small and compact. When settled under the government plan, the unit will not be above 10 acres. The metropolis of the Uncompahgre Valley is Montrose, an up-to-date little city, with churches, theater, schools, etc.

The turning of the waters into the Gunnison tunnel will be fittingly celebrated early in September. President Taft is expected to be present at the time and make an official inspection of the work. The Colorado chief executive and many prominent citizens of the state and nation will be invited. President Taft is expected to press the button that will send the waters rushing through the tunnel and into the canal and will thus mark the initial use of the greatest irrigation work of the present age.

NEW INCORPORATIONS.

UTAH.—Cedar Creek High Water Irrigation Company of Mt. Pleasant, capitalization $15,000, in 750 shares of $20 each. Ole Hansen, president; C. W. Sorenson, secretary; Christian Rasmussen, treasurer.

COLORADO.—Colorado-Texas Land and Irrigation Company, Frank R. Park, Horace B. Holmes and Charles H. Cheney, $100,000; Boulder.

Twin Reservoir Irrigation Company, T. M. Morrow, J. A. Bentley, E. J. Burns, Grand Junction; $250,000.

MONTANA.—Brady Irrigation Company; capital stock, $50,000; main office, Choteau; directors, Alexander Truchot, Thomas O. Larson, Kenneth McKay.

TEXAS.—Zavela Land and Water Company of San Antonio; capital stock, $200,000. Purpose, irrigation, city waterworks, etc. Incorporators, I. T. Pryor, C. C. Clamp, E. A. Hutchins and C. T. Estes.

DELAWARE. — Sacramento Valley Irrigation Company, Wilmington, Del.; capital, $10,000,000.

Send $2.50 for the
Irrigation Age
one year and the
Primer of Irrigation

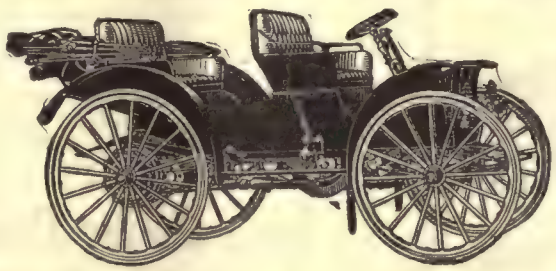
(Continued from page 376.)

come together to broaden all and militate for the millennium of universal brotherhood.

Those who have craved to see Alaska find the wonderfully complete exhibit that the land of gold, of forest wealth, and of fishery millions, as well as of almost unparalleled beauty, ample to satiate their desire and give them that erudition for which they have longed. The warmth and color of the south seas has been transported to the island exhibits, and the Philippines and Hawaii vie with Alaska in the completeness of their story. Japan demonstrates the wonderful strides towards the highest civilization that recent years have seen taken in the Orient, and characteristically makes even its most practical exhibits beautiful with unique art. The strumming samison of the flowery kingdom is heard with the weird melodies of the Asiatic mainland and the haunting voices of Hawaiian singers. In contrast to this unfamiliar music are concerts, classical and popular, of America's foremost bands and of great choral bodies.

The United States government is represented by a larger building and more extensive exhibits than ever before and has joined with local enterprise in Hawaii, the Philippines and Alaska to exploit these most valuable, though not yet thoroughly acquainted, possessions. A sum of $60,000 was appropriated by congress and this has been utilized to splendid advantage at the fair where ten millions of dollars have gone to woo success.

International Auto Buggy



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Its high wheels and powerful driving mechanism especially fit it for the kind of service that puts the low automobile out of business.

It is under as perfect control as the highest priced automobile. You can go at any speed you like, two to twenty miles an hour. There are no tire troubles because the tires are solid rubber. You have the least concern about fuel supply or operating expense. The Auto Buggy carries a supply of gasoline sufficient to last for a journey of 75 to 100 miles.

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Call on the International local agent and get a catalogue and let him demonstrate this wonderful country road car for you; or, write to the nearest branch house for particulars.

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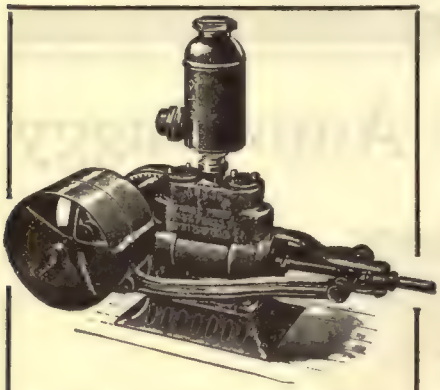

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All valves can be removed for cleaning or repair by unscrewing the caps on either side of air chamber.

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The Primer of Irrigation

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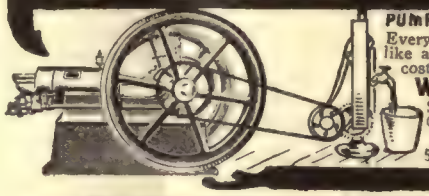

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Wouldn't it be a happy condition not to be dependent on the company ditch or the favor of the water superintendent?

Then, adopt the safe and sure method of irrigation by pumping. Hundreds of farmers are coming around to this modern way of irrigating.

Some are building individual reservoirs on their own land and are filling them by pumping the water.

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Irrigate by Pumping Water with An I. H. C. Gasoline Engine

The modern, powerful I. H. C. gasoline engines make all this possible.

Farmers find that they not only make sure of all the water they need just when they need it, but they find it an economical way to irrigate.

You will have no trouble in learning to operate one of these engines. They are simple and easy to understand and they require but little attention.

For general farm purposes there are many styles and sizes of I. H. C gasoline engines:

Vertical 2, 3 and 25-horse power.

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Gasoline tractors 12, 15 and 20-horse power.

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Or, if you prefer, write direct to nearest branch houses.

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INTERNATIONAL HARVESTER COMPANY OF AMERICA, CHICAGO, U. S. A.
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When writing to advertisers please mention The Irrigation Age.

(Continued from page 377.)

Grains and alfalfa to which the lands have heretofore been largely devoted, are in exceptionally fine form this year. Farmers are predicting immense crops and at this time their hopes seem in a fair way to full realization.

It is rumored that within a short time new industries will be located in the Taos valley. Increased acreage and prospective heavy yields of grains have overloaded the flour mills, beet raisers are negotiating with a sugar manufacturer for construction of a plant, and the steadily increasing stream of visitors has produced rapid growth of Taos and its surrounding villages.

Engineering parties are surveying and making estimates in preparation for the active commencement of work on a new railroad project from the north. The Ranchos Orchard & Land Company is vigorously prosecuting its construction work.

Preparation is now being made for the crowds of tourists who come each year to witness the mystic rites and ceremonies of the Taos Indians. These ceremonies, occurring late in September of each year, are both interesting and spectacular, and although barred from knowledge of their meaning, the tourist and student sees much that awakens the speculative inquiry into this remnant of an earlier civilization.

ANNUAL ELECTION.

The annual election of officers of the Sacramento Valley Development Co. resulted as follows: President, Marshall Diggs; vice presidents, B. Cussick of Butte County, Morris Brooke of Sacramento County, Ben Rush of Solano County, A. L. Conrad of Tehama County, J. W. Kaerth of Colusa County, H. P. Stabler of Sutter County, T. B. Gibson of Yolo County, C. F. Aaron of Yuba County, E. B. Willis of Placer County; treasurer, C. F. Dillman; secretary, O. H. Miller.

The supervising engineer in charge of reclamation work in North Dakota has arranged for a detailed reconnaissance of the four principal streams in southwest North Dakota—the Little Missouri, Knife, Heart and Cannon Ball. A previous survey indicates that there is no large feasible project in connection with these streams, but it is thought there may be some small projects, and it is proposed to put in two or three small parties to locate irrigable lands and storage sites, if there be any.

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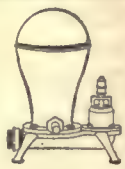

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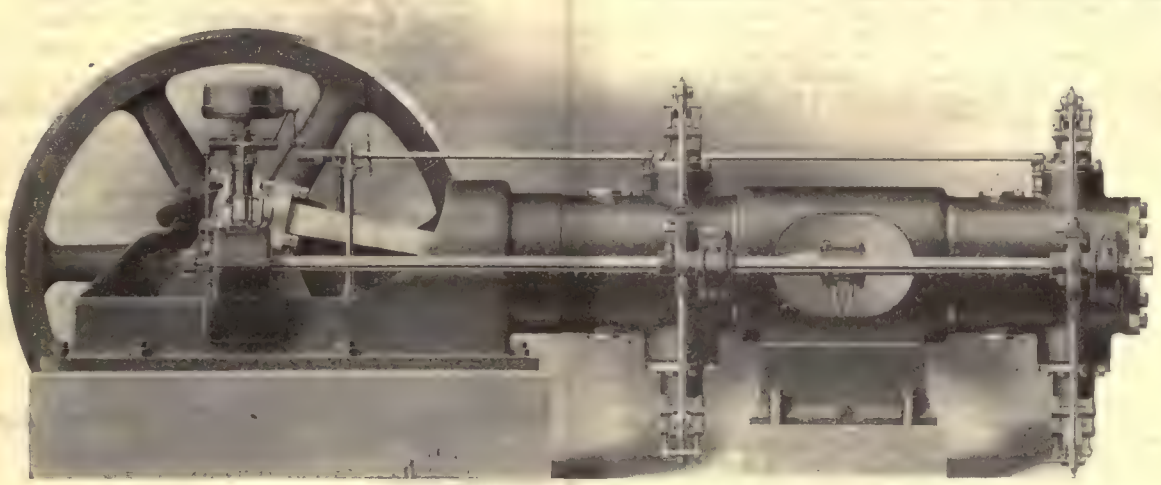

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CATALOG ON APPLICATION

BUCKEYE ENGINE COMPANY, - Salem, Ohio

Supreme Court Decisions

Irrigation Cases

The same irrigation ditch may have two or more priorities belonging to the same person or to different persons.—*Park* v. *Park.* Supreme Court of Colorado. 101 Pacific 403.

DUTY TO CLEAN DITCHES.—

If a ditch was constructed by agreement of persons and recognized as a waterway, neither person would be compelled to clear it of rubbish, but either person might do so.—*O'Mara* v. *Jensma.* Supreme Court of Iowa. 121 Northwestern 518.

LANDLORD'S FAILURE TO FURNISH WATER.—

Damages suffered by a tenant, consisting of injuries to his crop because of the landlord's failure to furnish water as agreed, are not objectionable as speculative and uncertain.—*Dunbar* v. *Montgomery.* Court of Civil Appeals of Texas. 119 Southwestern 907.

RIPARIAN RIGHTS.—

Riparian rights exist in the state of Idaho only to the extent that they do not come in conflict with the superior and paramount right of one who has appropriated the waters for a beneficial use in conformity with the Constitution and statutes of the state.—*Hutchinson* v. *Watson Slough Ditch Co., Ltd.* Supreme Court of Idaho. 101 Pacific 1059.

CONDEMNATION OF IRRIGATION CANAL.—

Where the necessity for the taking is shown, one canal company will be allowed to condemn a part of the right of way of another canal company, for the purpose of enlarging the old canal to a sufficient capacity to carry such additional volume of water as may be needed for the use of the latter company.—*Portneuf Irrigating Co., Ltd.,* v. *Budge.* Supreme Court of Idaho. 100 Pacific 1046.

PREVENTING USE OF WATER.—

If a corporation engaged in the business of supplying individuals with water for the irrigation of arid or semi-arid lands, unlawfully and arbitrarily prevents the holder of one of its water contracts from using water for the irrigation of a field of growing potatoes, it is liable to the individual in damages.—*Clague* v. *Tri-State Land Co.* Supreme Court of Nebraska. 121 Northwestern 570.

RIPARIAN RIGHTS INFERIOR TO APPROPRIATION.—

A riparian owner's right to use the water of a stream for domestic and culinary purposes and watering his stock, and to have the water flow by or through his riparian premises, is such a right as the law recognizes as inferior to a right acquired by appropriation, and superior to any right of a stranger to or intermeddler with the waters of such stream.—*Hutchinson* v. *Watson Slough Ditch Co., Ltd.* Supreme Court of Idaho. 101 Pacific 1059.

RESERVOIRS.—

Mills' Ann. St. sec. 2272, declares that the owner of a reservoir built and used for storing water for irrigation shall be liable for all damages arising from seepage or overflow, etc. *Held,* that the right of storage conferred by such section included surface or flood waters, as well as waters diverted from natural water courses.—*Canon City & C. C. R. Co.* v. *Oxtoby.* Supreme Court of Colorado. 100 Pacific 1127.

ARTESIAN WELLS.—

Where new artesian wells objected to draw their water from the same supply from which the owners had previously taken water under a valid diversion, and the new wells did not increase the amount diverted, they constituted a mere change of the place of diversion, without injury to others who were therefore not entitled to complain.—*Barton* v. *Riverside Water Co.* Supreme Court of California. 101 Pacific 790.

LANDLORD'S DUTY TO FURNISH WATER.—

Where a lease required the landlord to furnish water for the tenant's crop at prices to be thereafter agreed on, and no agreement was made for the year 1906, the tenant could not recover for the landlord's failure to furnish water for that

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Open to Settlement

Some of the richest and most productive farm land in the world lies along the Shoshone and the Big Horn Rivers in the "Big Horn Basin" of Wyoming. Over ten million dollars is being spent by the United States Government and by private enterprise in building great concrete dams and ditches in order to lead an inexhaustible supply of water to irrigate some of the best of these lands and make them independent of rainfall. A great portion of this work is completed, and these lands, with a perpetual supply of water for irrigating them, are now offered you on reasonable terms.

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to get a wonderfully productive farm, with water whenever you want it, regardless of rainfall; in a country where a single crop can be made to pay for the land; where 50 bushels of wheat or barley, and 75 bushels of oats are commonly grown to the acre; where fruits grow luxuriously and where the glorious air and sunshine, summer and winter, make life a joyous thing.

This wonderful country is developing fast. Churches and schools abound. The population is intelligent, Godfearing and law-abiding, and any man out there who is half a man has the opportunity to make himself independent.

Land in this great country is going fast. If you have any thought for the welfare of yourself or children, find out all about this opportunity to-day.

Send for our new folder with large map, and **also folders issued** by the private irrigation companies and by the United States Government Reclamation Service **giving all information about these lands, terms, etc. Free for the asking.** Study these folders and then **come with me** on my next excursion to the Big Horn Basin and **see for yourself.** My excursions, which I personally conduct, leave Omaha on the 1st and 3d Tuesday each month, on which days reduced railroad rates are in effect. My services are free to you.

Burlington Route

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Landseekers' Information Bureau,

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N. B.—The winter weather in the Basin Country is fine and lands can usually be seen to advantage all Winter,

year, on the theory that the landlord demanded an extortionate rate greatly in excess of the reasonable value of the irrigation.—*Dunbar* v. *Montgomery*. Court of Civil Appeals of Texas. 119 Southwestern 907.

SHORTAGE OF SUPPLY.—

Where contracts made between an irrigation company and users of water from such system provide that, in case of shortage, the persons holding such contracts should receive only their pro rata share of such water, in a controversy between the company and a user under such contract, the court should decree to such user, in case there is a shortage, only his pro rata share of such water.—*Jackson* v. *Indian Creek Reservoir Ditch & Irrigation Co., Ltd.* Supreme Court of Idaho. 101 Pacific 814.

RIPARIAN RIGHTS.—

A riparian owner has the right to make any use of the water, beneficial to himself on the riparian land, which his situation enables him to make; but, if his use involves a consumption of the water, he can not use more than his reasonable share as compared with other riparian owners, and he must not pollute the water to the injury of others entitled to it, and the water he does not consume must be returned to the stream before it passes his land.—*Mentone Irr. Co.* v. *Redlands Electric Light & Power Co.* Supreme Court of California. 100 Pacific 1082.

INNOCENT PURCHASERS WITHOUT NOTICE.—

Where a decree in proceedings to adjudicate priorities in an irrigation ditch recited that the water was claimed by three persons, but was not in harmony with their statements of claim, and especially disclaimed the intention of deciding the question of ownership among them, reasonable diligence would require a prospective purchaser of a portion of the land to investigate the title to priorities, and, where the three persons after the decree openly continued to use all the water for irrigating their farms as before the decree, it was constructive notice of their rights.—*Park* v. *Park*. Supreme Court of Colorado. 101 Pacific 403.

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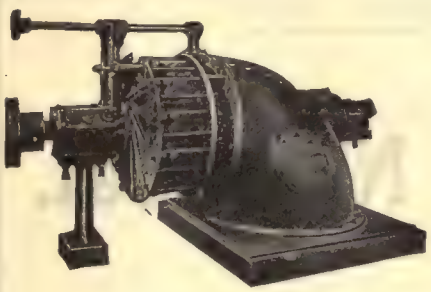

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When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the HIGH SPEED of the SAMSON, for a given power, lighter and consequently CHEAPER transmission machinery can be used.

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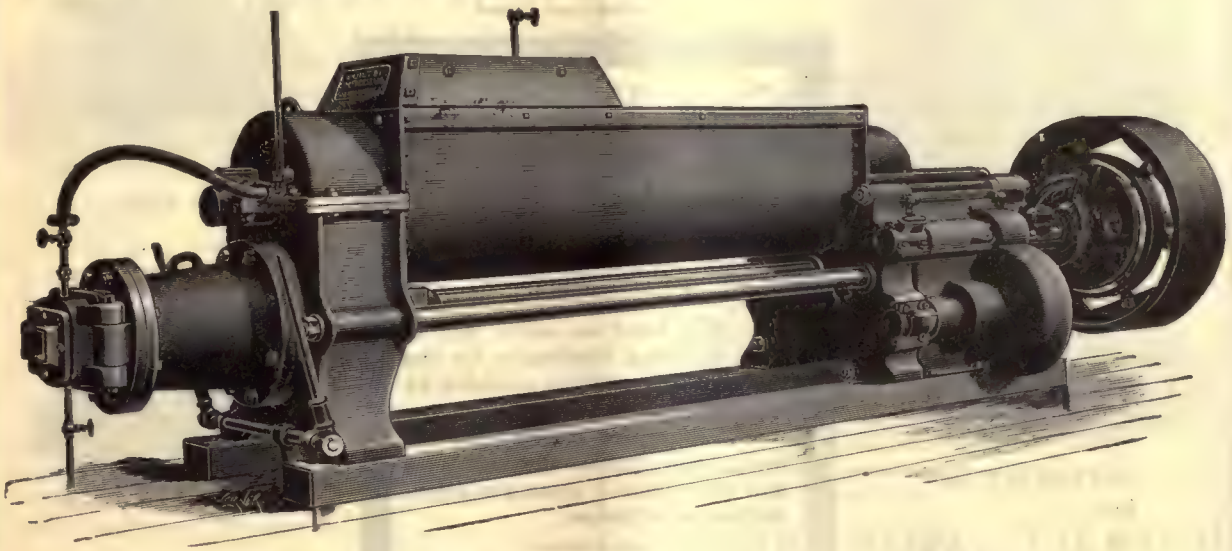

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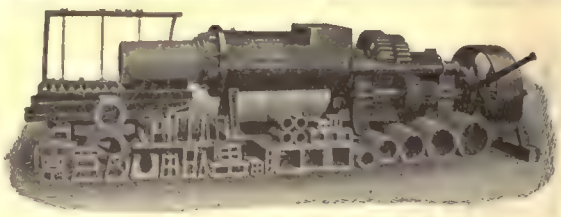

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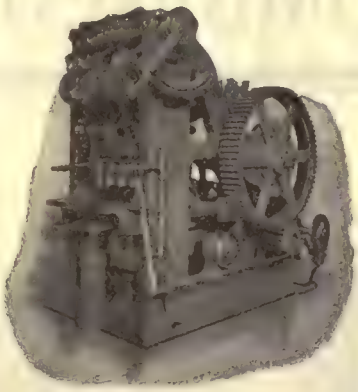

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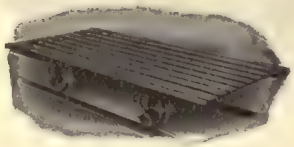

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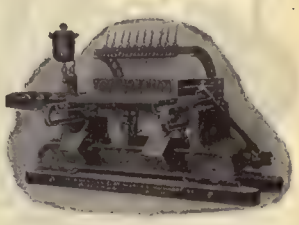

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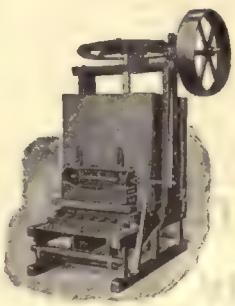

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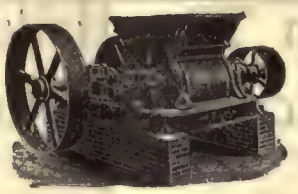

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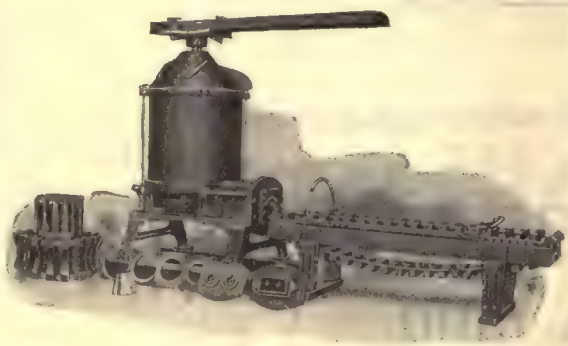

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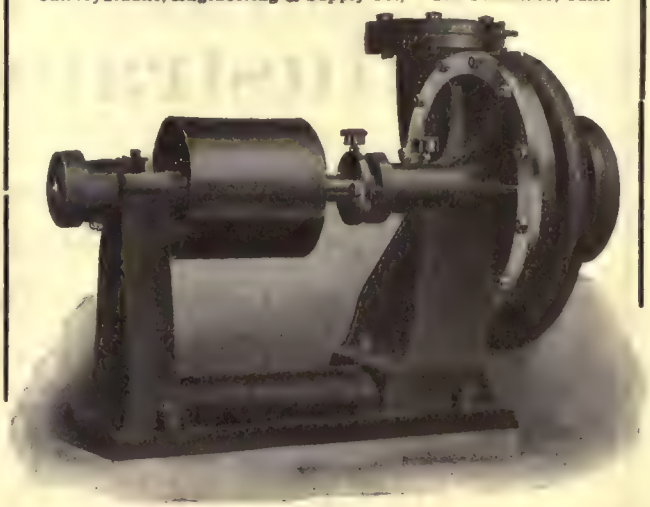

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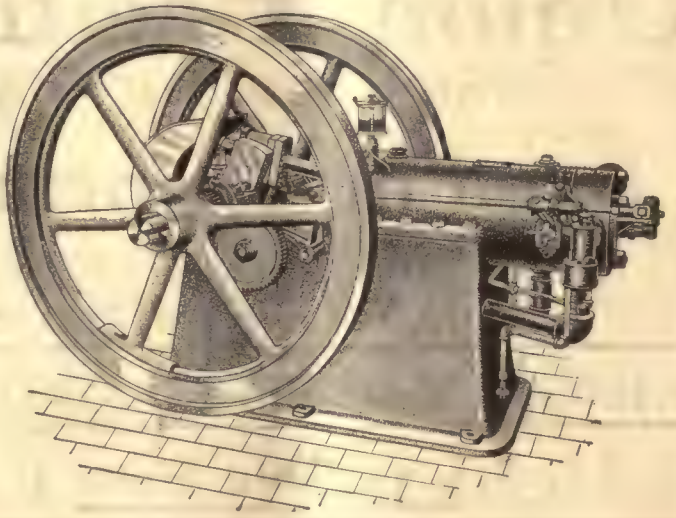

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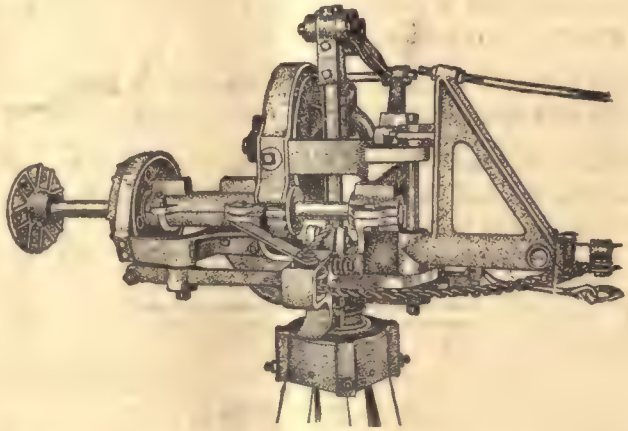

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CHICAGO, SEPTEMBER, 1909

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United States Land and Irrigation Exposition

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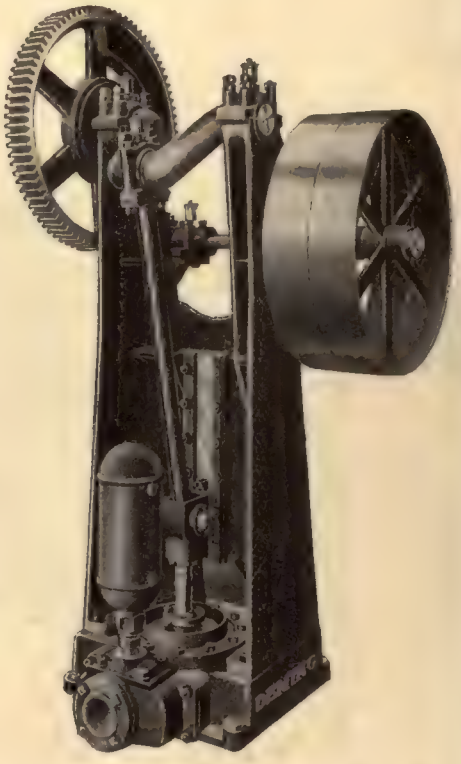
Deep Well Working Heads



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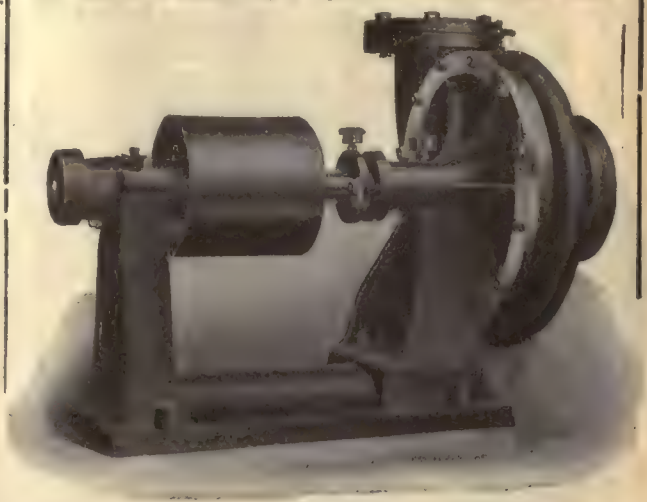

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Fig. 1294

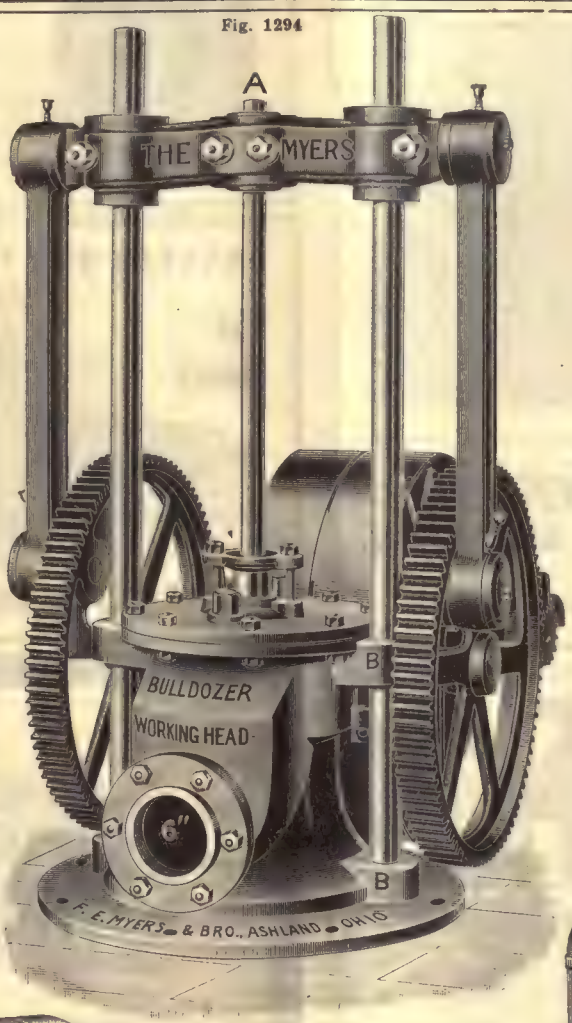

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Fig. 813

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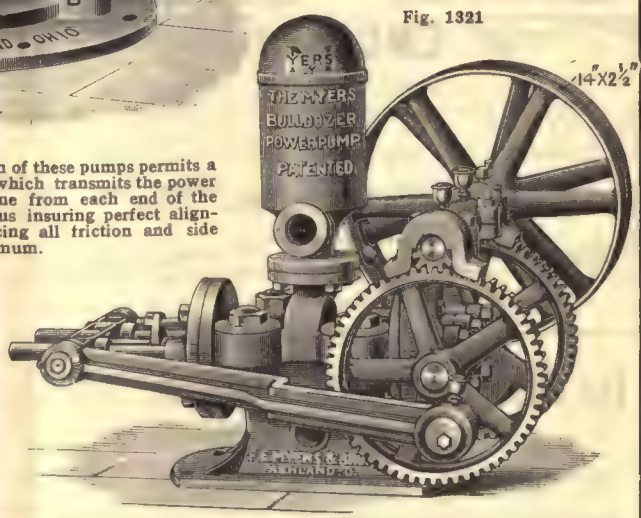
Fig. 1321



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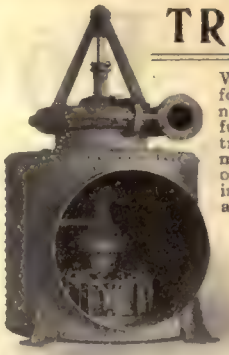

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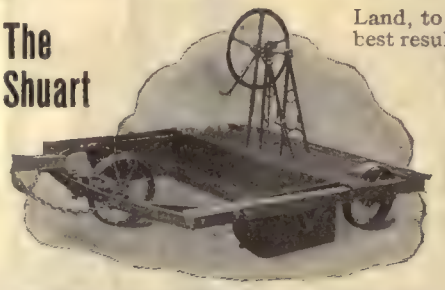

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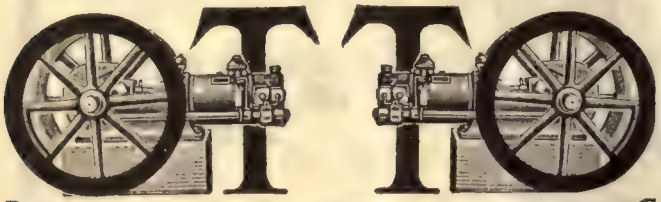

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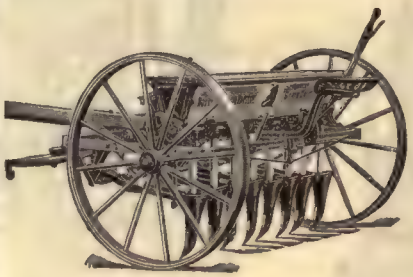

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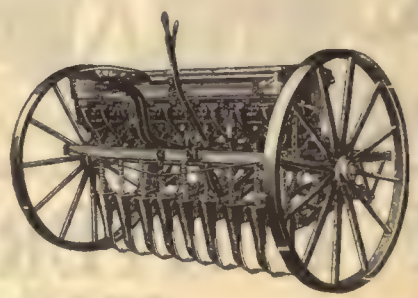

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THE IRRIGATION AGE

VOL. XXIV CHICAGO, SEPTEMBER, 1909. NO. 11

THE IRRIGATION AGE
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THE IRRIGATION ERA MID-WEST
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D. H. ANDERSON, Editor

ANNOUNCEMENT.

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Lobbyists Control Spokane Congress.

In many respects the Seventeenth National Irrigation Congress, held at Spokane during August, was the most interesting and instructive gathering ever held by this organization. Speakers of national repute presented able addresses, and the discussions, earnest but often incisive, have resulted in the fomentation of popular interest in irrigation and conservation.

The congress as a whole, was, however, a disappointment. Very few of the "old guard" were there and the deliberations and the various committees organized to act, were controlled by a set of men who have attempted to pose as dictators at almost every congress. It is significant that no concerted action can be taken by the general irrigator and the man who is interested in private projects to so shape the conduct of that body as to benefit more largely the great mass of people interested in this industry.

It is a lamentable fact that many old time lobbyists are always on hand with axes to grind for this or that corporation, and as a rule the local governing body of the congress fears to antagonize these interests, hence the result is a program dominated by corporations and other interests only indirectly interested in active irrigation work.

It was early seen by those who are interested in actual reform that the lobbyists had absolute control and, while some of the more daring of the minority objected to the rules as laid down by the corporations, no definite results of lasting character were obtained.

There is much talk now among those who are foresighted and interested in the future welfare of the congress to so shape affairs at Pueblo as to allow the active irrigator and the promoter of private projects a voice in the deliberations of that meeting. There are surely enough projects of a private character in Colorado, western Kansas, New Mexico and Wyoming, all of which are tributary to Pueblo, to encourage and assure the attendance of this class of delegates at the eighteenth congress, and it is reasonable to predict that at Pueblo some positive steps will be taken to liberate that meeting from the band of hired lobbyists who controlled the Spokane session.

Mr. Insinger and his assistants handled the Spokane affair in a masterful way so far as exploitation and entertainment were concerned. They surmounted many difficulties, and among other serious conditions that of the disaffection of the Board of Governors who attempted to tell them how their fund of $60,000 or $70,000 should be spent. The chairman of the Board of Governors, we are informed, would not act in any capacity after he had learned that a considerable part of the fund would not be turned over to him for exploitation, or other purposes. This "band" of governors had in its list of members the names of some very estimable gentlemen. All of the members of the board, however, could not be so designated.

The railway companies of America will some day awaken to the fact that they can accomplish more good for the country at large by sending, as their representatives, actual irrigators along their lines, than by putting their agents in each congress. Mr. Harriman and his assistants acted wisely in withdrawing his representatives from active work at the congress. He was represented there, to be sure, but not in as positive or stubborn manner as were some of those connected with the Great Northern and other railway lines.

It is a question how long this evil will be tolerated, but there is good reason to believe that much good will result from the work of the minority at Spokane in its attempt to correct this condition at the Pueblo meeting. If a move of this character is not made at Pueblo and the congress passes into absolute control of the railways and the Reclamation Service and the Forestry Service officials, it may be predicted that the people interested in private projects and the actual irrigator will organize a congress along other lines which will be controlled by men who have at heart the best interest of the irrigated west.

This brings to mind the strange condition illustrated by the connivance of the railways and the Forestry and the Reclamation Bureaus when at times both of these branches of the government work at direct variance with what the railway people believe to be better for them.

One of the most alarming incidents which arose at the congress was that in which Mr. Gifford Pinchot, head of a subordinate bureau, attempted to discredit the Secretary of the Interior, a cabinet officer. It is safe to say that Secretary Ballinger will not tolerate this sort of work on the part of a subordinate in another department, and it is perhaps well that the matter was brought to a head at Spokane so that it may be settled decisively and permanently.

U. S. Land and Irrigation Exposition.

Now that the Seventeenth National Irrigation Congress has passed into history, we turn to the next great event, the United States Land and Irrigation Exposition, to be held in Chicago November 20th to December 4th, 1909.

It is with satisfaction that we note this spontaneous outburst of enthusiasm upon a subject so long held sacred to our columns.

As the architect looks upon the progress of his plans, and the tiller of the soil sees with kindling eye and loving heart the product of his thought and labor, we, in this triumph of irrigation, feel and hear the Voice saying, "Well done." And so THE AGE joins with its friend the Tribune in thus advancing the cause of irrigation, and welcomes this great paper into its family.

A master stroke of policy was this on the part of the Chicago Tribune, and THE AGE bespeaks for the United States Land and Irrigation Exposition the hearty support of all true factors in the great work of reclamation and cultivation.

Following is the announcement appearing in the Tribune:—

"From November 20th to December 4th of this year will be held in the Coliseum, under the auspices of the Chicago Tribune, the United States Land and Irrigation Exposition, which will provide authoritative, graphic information about the vast land opportunities now opening up in the many states for homeseekers, farmers and investors. There will be exhibits of the wonderful fruits of this virgin soil from all sections of the country. Elaborate panoramas will show what is being done to irrigate, drain and cultivate it. Arrangements have been made for government exhibits of great value to the farmer and of vital interest to every lover of American soil."

Press Assails Spokane Doings.

Many prominent men throughout the West who attended the National Irrigation Congress at Spokane have voiced their opinions of the proceedings of that body to their home newspapers and the tone of the editorial comment is not likely to prove pleasant reading for those who radically controlled the actions of the Spokane congress. In a clipping from the Seattle Times of August 23, under the heading, "Radicals Control Irrigation Congress," appeared the following:

By giving extremists and other irresponsible persons too much to say in its recent session at Spokane, the National Irrigation Congress has done itself harm, and its proceedings which were marked with considerable disorder, including various attacks on Secretary R. A. Ballinger, Secretary of the Interior, were not calculated to inspire confidence in or respect for its deliberations. Such is the opinion of Seattle men who have returned from the capital of the Inland Empire.

"One of the worst mistakes the delegates to the congress made," said G. W. Morrow, of the Milwaukee Land Company, "was to bitterly attack private capital interested in irrigation enterprises. These attacks were without excuse or justification and, from what I could gather, seemed to be due to a desire on the part of a great number of the delegates to start some kind of a fracas.

"Furthermore, the congress showed signs of irresponsibility when a resolution was introduced asking the government to issue bonds aggregating $5,000,000,000 for reclamation projects. This resolution, as finally

passed, named a sum of $50,000,000, which showed an agile handling of figures, if nothing else.

"Serious minded advocates of irrigation, both by federal government and by private enterprise, were astonished at the general tone of hostility toward private irrigation companies, as shown in the treatment of H. L. Hollister, general manager of the Twin Falls Irrigation and Power Company. This company has spent millions in the successful watering of nearly 150,000 acres of land in Idaho. The project is completed and the railroad the corporation built into the territory is handling fifty carloads of produce per day from the district.

"Mr. Hollister is known throughout the West as one of the ablest and squarest men in the country and his company is carrying the settlers along its immense works in an amount exceeding $20,000,000. Their policy has been to aid the settler, and no single instance can be found where they have taken land away from a delinquent purchaser. Yet, in spite of the known record of the Twin Falls Company, the delegates to the Irrigation Congress took a rap at the concern. Mr. Hollister, indignant but too self controlled to fight a mob, quietly ignored the attacks made upon him."

Mr. Morrow has charge of the townsites along the line of the Chicago, Milwaukee & Puget Sound Railway in Idaho and Washington.

This is a fair sample of numerous clippings showing sentiment in all parts of the West.

It is the opinion of THE IRRIGATION AGE that Newell, Pinchot and the representatives of some of the railroads have gone too far and that the importance of the irrigation congress as at present conducted is decadent. It is predicted that after the meeting at Pueblo in 1910 a new organization may be formed which will be conducted in the interest of actual irrigators and those connected with general irrigation development rather than for a few paid government employes whose terms in office are controlled by silly, persistent resolutions passed at each congress extolling their virtues. From the regularity with which resolutions favorable to the Reclamation and Forestry bureaus are jammed through the congress one would imagine that some sort of a sop is absolutely necessary to the existence of these bureau heads.

Private Interests Suffer.

THE IRRIGATION AGE suggests to Secretary Ballinger that he investigate the claims of the people who first started reclamation work near Yuma, Ariz. Several well known men of that territory, associated with capitalists from a northern state, invested a large sum of money, but their project was killed when the government officials established what is known as the Yuma project above that city, thereby depriving these gentlemen, so it is stated, of their rights and causing them to lose a large sum of money.

Secretary Ballinger could also find an interesting condition in the Owens River valley in California, where both the Reclamation and Forestry bureaus have been instrumental in withholding from the early settlers their rights to reservoir sites and water. A careful investigation of both localities would no doubt bring forth some interesting facts.

Third Termers' Idiotic Action.

The Seventeenth National Irrigation Congress had a surprise sprung on it by the Reclamation and Forestry bureaus in the selection of a co-worker in both branches, B. A. Fowler of Arizona, as President. Mr. Fowler has always played into the hands of Messrs. Newell and Pinchot and in return has received all encouragement and appointments that could be thrown his way.

Mr. Fowler has had various ambitions in times past. He was defeated for congress from Arizona a few years ago. One incident which shows how the wind blows was the open applause by Mr. Fowler and President Barstow during the addresses by Pinchot and Newell while they were acting as officers of the congress. This was, to say the least, undignified and inexcusable. If Theodore Roosevelt had anticipated that this group would perform such raw work in exploiting the third term idea he would have forestalled it. But—Theodore was in Uganda. Oh, Uganda, how much of the strife of men and nations reaches the forests of thy remote interior? Oh, Barstow, Fowler.—Newell and Pinchot, Uganders.

To Store Rio Grande Flood Waters.

In special dispatches from San Antonio, Texas, statement is made that plans have been matured in the lower Rio Grande Valley for the most gigantic irrigation project in the southwest.

The flood waters of the Rio Grande will be diverted to an artificial lake, which will hold two billion cubic feet of water. Although the immense flow of the Rio Grande makes any danger of exhaustion a matter too remote for consideration, nevertheless the Mexican government, under the peculiar treaty which may cause trouble at some future day, has claimed its share of the waters of the Rio Grande, and this immense project is designed as a safeguard. Twice a year the Rio Grande is in flood, flowing in three or four times its usual volume. These flood waters will be caught and the lake thus formed will irrigate 150,000 acres and provide homes for about twenty-five thousand families.

A few miles in from the river proper, at the bend where this reservoir is to be located, is a chain of lakes and recesses, evidently ancient beds of the river. These recesses are already partly filled with water in flood times.

Irrigation Bonds.

It is but natural that irrigators should favor a class of investment creative of their very foundation, nor is it strange that thoughtful investors readily acknowledge the merits and superiority of a class of security so rigid in its basic principles and yet so elastic in detail.

Take as an illustration the great Standley Lake and Dam, nine miles northwest of Denver. The lake or reservoir will empound over one hundred thousand acre feet of irrigation water for use in the season 1910, with as much more as a final capacity. Then consider the great dike thrown across the valley, over a mile in length, with an elevation of one hundred and forty-two feet. This monster earthwork is over six hundred feet thick at the base and under all this mass has been placed drainage or seepage wells in great number to control possible undercurrents, and through the center length has been driven, in solid clay, sheet steel piling, tongue and grooved, to bed rock. Then a base core, near three hundred feet wide, of puddled clay, is carried tapering to the top, with a concrete face and parapet presented to the waters as they come tumbling from the mountain gorges and canals to be stored for irrigating the lands below and beyond, which lands thus reclaimed from the desert wastes, together with all irrigation improvements, compose the basic value of irrigation bonds.

We might multiply illustrations, citing Wyoming, Idaho and other great irrigation districts, but it suffices, in this enlightened period, to recall but a few well-known features and effects relied upon by investors:

Irrigation Bonds are divided into three general classes, Municipal District Bonds, Corporation Bonds on lands in private ownership and Corporation Bonds issued against lands under the provisions of the Federal Law known as the "Carey Act."

The security lying back of irrigation bonds is considered superior to farm mortgages, which do not exceed forty per cent of the value of farm land and are rightly considered a first-class security. When such farm mortgages are placed with a trustee, and bonds issued against them to not more than two-thirds of their value, this security is considerably increased. And when such bonds are further secured by mortgage on vast properties of an Irrigation Company, it will be seen that the protection is fully as ample as the most careful investor desires.

Arid land, when water is applied, becomes the most productive farm land in America. Colorado, which contains one of the largest irrigated areas of any state, will serve as an illustration of the productive power of irrigated lands. It should be remembered that all of the plow land in Colorado, save that used for "dry farming," is irrigated land. And the farm products of Colorado last year were valued at over one hundred and forty-three million dollars.

Rocky Ford canteloupes, grown on irrigated land in Colorado, are famous the world over. They sell for $2.50 per crate, while other melons on the same market, grown from the same seed, sell for thirty cents a crate.

Peaches from the Grand Junction district bring from four to six times as much as middle west peaches.

Fruit lands in the Denver-Greeley district often yield more than one thousand dollars per acre.

Colorado potatoes maintain the highest standard everywhere, and sugar beets stand first in the production of sugar.

In California, Oregon, Washington, Idaho, Wyoming and Montana, irrigated land is among the most valuable and productive farm land in America.

Perpetual sunshine and water supply under perfect control, yield crops of the highest grade from the lands upon which irrigation bonds are based. Every farmer is his own weather man and is able to give to each crop just the water it needs at the time when it is needed.

It is safe to say that good irrigated land is worth from three to five times as much as the best rainfall land, measured by production.

We have again and again watched irrigation projects begun and carried to completion. We have seen barren land blossom into fertility. We have seen it multiply in value, over and over, until some of it has grown to be the most valuable farm land in America.

Irrigation bonds now pay a higher interest rate than one can secure on any large class of securities equally safe. One reason is that the bonds are a comparatively new form of investment. They have only come into wide popularity in recent years.

Irrigation bonds are usually issued in denominations of one hundred dollars, five hundred dollars and one thousand dollars. This opens the field to the small investor, as well as banks and capitalists.

We know of no class of bonds which at present offer equal security combined with equally attractive income.

Unlike the vast majority of bonds, irrigation securities are paid, and not simply refunded at maturity by substituting new ones. Each series is retired as fast as it falls due by the payment of actual cash.

Notes and Comment on Recent Congresses

MUST HAVE NEW ORGANIZATION.

Under this caption, George B. Fraser, editor of the News, Twin Falls, Idaho, expresses his views on the Seventeenth Congress:

"The National Irrigation Congress is still dominated by the reclamation service and forest service to such an extent as to threaten its usefulness and now there is a movement on foot to organize a body for taking up irrigation matters on an independent and more scientific basis," declared S. H. Hays, to a Boise Capital News reporter, upon his return from Spokane, where he has been in attendance at the seventeenth annual session as a member of the Idaho delegation.

Owing to much dissatisfaction over the arbitrary repulsive manner in which the reclamation and forest services together with the Great Northern Railroad interests act, it is probable that arrangements will be completed for a meeting of representatives of irrigated states to be held in Chicago this fall, when a separate and distinct organization from that maintained in the past with the National Irrigation Congress will be formed.

Instances of the domination of forest service, reclamation service and Great Northern over the annual session of the congress held in Spokane were manifest in practically every session of the congress, according to Mr. Hays. The program which contained 49 subjects that were discussed at the congress disclosed only 21 relating to irrigation and only six practical subjects on irrigation in that number. Then also the presence of Costello, traffic manager of the Great Northern Railroad, which is assiduously endeavoring to secure the expenditure of thousands of dollars by the forest service for improvements along the railroad right of way was considered distasteful to delegates desirous of considering irrigation problems. The position assumed by the forest reserve with respect to the operation of power plants was still another cause for dissatisfaction and raised a strong protest from the delegates of irrigated states.

"The general purport of the addresses of Secretary Ballinger of the Interior Department and of Chief Forester Gifford Pinchot, might be described in this way," continued Mr. Hays. "Secretary Ballinger stood for the doctrine that the law must be followed and obeyed, that if there is any defect in the law, it should be remedied by congress, while Mr. Pinchot's address conveyed the sentiment that it would be well to go ahead doing things and let the law take care of itself."

Of the Pinchot-Ballinger feud, returning delegates speak of an instance that was remarked about by nearly everyone in attendance at the session of the congress. The incident is related as follows: Secretary Ballinger was on the program for an address at one of the sessions of the congress, and before that session convened, Mr. Pinchot and a friend went to the speaker's platform, taking seats thereon with other officials in attendance at the meeting. Secretary Ballinger a few minutes later came to the speakers' platform to take a seat in readiness for the address which he was to deliver. Upon stepping on the platform he was received by all officials on the platform, except Pinchot and his friend, who continued their conversation uninterrupted, while the other officials arose and shook hands with the secretary of the interior.

The following relating to the Pinchot-Ballinger controversy appeared in the Denver Post:

Government officials of Denver have discovered that an absolute treaty was made between Secretary of the Interior Garfield and the agricultural department when all of of the lands were turned over to the care of the forestry department a couple of years ago, and which have since been returnd to the department of the interior by Secretary Ballinger with the approval of the president.

It was a transaction never before heard of in the history of the government and was denounced by United States Attorney General Wickersham as one of the worst pieces of personal law making that the government has ever seen.

The government legal adviser was likewise severe in his denunciation of the agreement made between the people interested in the Grand Valley canals and the government. He said at the time that the government had no right to make any agreements of the kind, becoming a party to a private enterprise, and that no one had a right to promise any money without congressional sanction.

TRANS-MISSISSIPPI NOTES.

BY G. L. SHUMWAY.

Two of the great industrial congresses of 1909 have passed into history. The one at Spokane—the National Irrigation congress—according to press dispatches, was something of a controversy wherein Forester Pinchot launched Roosevelt's third term boom, and Mr. Ballinger made plain the attitude of the present administration.

The third-termers hastened from Spokane to the Trans-Mississippi congress at Denver to continue their work, and received a frost, while Mr. Ballinger went on a tour of inspection in continuance of his official program of informing himself on the conditions and needs of the West.

The report of the Denver meeting, as appearing in Chicago and eastern Journals, were far from accurate. They were colored to show the astute advertiser, Mr. Pinchot, as the lion of the hour and President Taft only gets obscure mention.

The facts as shown by the resolutions adopted, as well as by the preponderance of debate, are that the forestry policies are as unpopular as ever, wherever people come in contact with them, and that the West is withholding its judgment of Mr. Ballinger until authorative statements are forthcoming.

The resolution which was unanimously adopted reflects this confidence:

"Resolved, That this congress composed of 2,000 members, is pleased and does hereby express its pleasure at the words of greeting from the President of the United States and responds with assurances of esteem, and confidence that our chief executive and his cabinet members, whose administration particularly affects Transmississippi affairs, are especially qualified to deal with these problems. And by reason of their knowledge of facts, law and justice, they will of their administration bring about a great prosperity incident to the development and utilization of natural resources which abound so abundantly in the West."

This was telegraphed to President Taft.

The series of resolutions rings with buoyant spirit, as the West feels the throbbing impulse of its six-cylinder energy once more to be unfettered and to start upon the journey toward vast development.

The present administration draws from the resolutions of the Trans-Mississippi congress the assurance that the West approves of its action in following the letter of the law. The law, not a set of rules promulgated by an official who is trying to foster feudalism upon this section, is what the West wants.

This water power trust, of which Mr. Pinchot dilates, is a "straw man." There is no such a creature and there can never be. For instance, Omaha now proposes a forty-mile canal from the Platte river to create 5,000-horse power. It will reduce horse-power energy in that city from $34 to $18. Anyone not satisfied may go up either the Missouri or the Platte and build another plant. Twenty such plants can be built in Nebraska alone. And any of the mountain states can find location for practically unlimitable power, provided the conservation idea does not prevail and compel these waterfalls to continue in the production of nothing but rainbow mist. Next to controlling air or sunshine water power would be most difficult to amalgamate.

SETTLERS COMPLAIN TO SENATORS.

Committee Headed by Sen. Carter Investigates Conditions on U. S. Reclamation Projects.

Leaving Chicago on Aug. 11 with an itinerary that led to government projects in the states of Montana, Wyoming, Idaho, Oregon and Washington, the senatorial committee on Irrigation and Reclamation of Public Lands, reached Seattle on August 29. After a two months' recess members will meet for another journey through Oregon, Utah, lower Idaho, Colorado and the southwest.

Senators who met at Chicago are: Thos. H. Carter, Chairman, Montana; Francis E. Warren, Wyoming; Frank P. Flint, California; William E. Borah, Idaho; George E. Chamberlain, Oregon; Thos. H. Paynter, Kentucky. Other senators who belong to this committee are: Bailey, Texas; Smith, Maryland; Briggs, New Jersey; Newlands and Nixon, Nevada; Jones of Washington; Gore, Oklahoma; Sutherland, Utah.

Secretary of the Interior Ballinger, who had already spent several weeks investigating conditions of government works and planning expenditures for the coming year, joined the Senate committee at Glendive, Mont.

On this trip the committees secured views of settlers and persons interested in each project and by the employment of a stenographer had all statements reduced to writing for future consideration. While there were no charges of mal-administration to be investigated, yet the committee had been requested by water users to take action on various phases of the reclamation work to cure defects in the law and to aid in the settlement of disputes.

Under direction of Senator Carter, the following list of questions had been sent to water users associations and other organizations of settlers on and near government projects.

First.—Is the existing reclamation law satisfactory and if not in what respect should it be amended?

Second:—Are your local laws governing the appropriation and use of water for irrigation satisfactory in their application to lands being reclaimed by the Government or through private enterprise, and if not what amendments are required?

Third.—Is the administration of the law by the Reclamation Service satisfactory, and if not what are the objections and what remedy is proposed?

Fourth.—Is your water supply adequate both for irrigation and domestic uses?

Fifth.—Where your towns have been laid out by the Reclamation Service how do you provide for the improvement of streets adjacent to lots owned by the Government, and do you provide a municipal water supply?

Sixth.—Is your canal and distributing system satisfactory, and if not what are the defects, what caused them, and what remedy is proposed?

Seventh.—Can the cost of maintaining and operating the canal and distributing system be reduced, and if so, in what way and to what extent?

Eighth.—Can the water users by employing reasonable industry and economy promptly make all payments required by the existing law?

Ninth.—What additional terms and conditions, if any, should be imposed on those who default in payment?

Tenth.—What are your principal crops, where do you market them and what, if any, organized effort is being made to put your crops into the market under the most favorable conditions?

MEMBERS OF SENATE COMMITTEE ON IRRIGATION.

Standing (from left to right)—Senators Sutherland, Bailey, John Walter Smith, Chamberlain, Jones, Gore and Newlands.
Seated (from left to right)—Senators Warren, Briggs, Carter (chairman), Flint, Nixon and Borah.

(Continued on page 429)

REPORT OF SEVENTEENTH IRRIGATION CONGRESS

Unprecedented Attendance,—Instructive Addresses,—Earnest Discussions, Strong Impetus Given to Irrigation Cause.

In completeness of preparation, in numerical strength of attendance and in the entertainment of visiting delegates during the five days of its existence, the seventeenth session of the National Irrigation congress passes into history as the most successful of gatherings since the inception of the organization.

Not less than 2,000 accredited delegates participated in the several sessions. Attracted by the preliminary press notices, large numbers of tourists, traveling to the Alaska-Yukon-Pacific exposition, remained a day or two to attend the congress and to learn of the details of irrigation work. It is declared by prominent irrigators who attended that there was more interest exhibited in the cause of irrigation than ever before and that lasting results must obtain.

Through the untiring efforts of the Board of Control, various features of entertainment had been planned, and in their execution excited the interest and amusement of visitors. In the parades, both visitors and citizens of Spokane joined to present a picturesque pageant and to incite enthusiasm in the cause of irrigation.

Almost every state in the union was represented by delegations and because of the widespread interest thus created much comment has come from local newspapers. An aggressive press bureau distributed speeches and minutes of the convention with such dispatch and regularity that newspapers in all parts of the country published excerpts and accounts of each day's meeting.

Of interest to those who were seeking information as to irrigation methods were the displays and demonstrations of the various plans to which water may be spread upon arid lands. For the practical irrigator the addresses, discussions and illustrated lectures proved of value.*

Musical organizations presented frequent numbers and programs for each session were arranged with a view to preventing loss of interest and decreased attendance. So carefully had the board handled its work that the ranks of delegates on the floor showed little variance throughout the convention.

While there was some criticism of the course of the work of the congress, each delegate gave unstinted praise to the city of Spokane and to these civic and commercial bodies, that by their cooperation and energy, had induced the large attendance and so admirably prepared for accommodation and entertainment of visitors.

MONDAY MORNING.

As the gavel in the hands of R. Insinger, secretary of the Board of Control, of Spokane, rapped for attention at 10 o'clock on the morning of August 9, the scene was most inspiring. Every seat in the great assembly hall was filled. There was a generous attendance of ladies, and about the banners of the various state representations were many of the wives and daughters of delegates, who had embraced the opportunity to view the great "Inland Empire" for the first time.

Gathered in the rear of the speakers' stand were the members of the Spokane Choral Society, whose singing of the irrigation ode soon after the opening of the first session, was the signal for intense enthusiasm. So favorable was the impression produced by the music that the society was accorded a rising vote of thanks.

Before surrendering the gavel to President Barstow, Mr. Insinger reviewed in brief the work of the Board of Control, declaring that its aim had been to avoid local issues and interests with the object of making the congress of national importance and benefit. In view of the work of his board he argued for the installation of a business system which should make the irrigation congress permanently effective and result in even greater success in the future.

In taking his place in the chair, President Barstow voiced a sentiment of praise for Spokane and the complete success with with its efforts at entertainment had been crowned. He then presented Governor Hay, of Washington, who spoke in part as follows:

The first National Irrigation Congress, composed of 11 delegates representing but four states and territories, met at Salt Lake City in 1892. Today, this, the 17th annual convention of that organization, composed of thousands of delegates, represents every section of the United States. This movement, inaugurated by a seemingly insignificant local gathering, soon passed beyond mere sectional interest and assumed the proportions of a great national awakening. The idea that gave birth to the congress soon caught the popular imagination because of its inherent merit and obvious importance. The country readily grasped the true significance of the purpose which animated the organizers of this congress and its bearing on the future welfare of the nation. The intelligent and effective agitation struck a sympathetic chord, which reacted directly on the national legislature, resulting in the passage of the government reclamation act of 1902. This act, known as the Newland's bill, committed the federal government to a comprehensive plan of reclaiming by irrigation those vast tracts of arable land otherwise waste and useless.

Reclamation by irrigation enlisted the attention of man long before he was confronted by the need of conservation. In fact, we have records of irrigation in certain portions of the globe dating back to the very dawn of history, and in some countries there are evidences of its use in pre-historic times. This aid to agriculture was used by the Chinese forty centuries ago, and has been practiced consistently in that country to the present time. In Egypt, when the pyramids were building and the sphinx an uncarved stone, the waters of the Nile were diverted to enrich the soil by rude and primitive methods that are still in use. Irrigation in India can claim equal antiquity to irrigation in Egypt and China. In India this aid to agriculture has been extensively used than in any other country.

At the present time, the total irrigated area in the land of the Rajahs is approximately 69,000,000 acres, 43,000,000 acres of which are under control of the state, and 26,000,000 acres controlled privately. Here the constructive statesmanship of England has performed as magnificent a service as it has in Egypt. British engineers have planned and constructed vast projects that are enduring monuments to the genius of their country. Great canals, 500 and 600 miles long, carry water from the Indus and the Ganges which is distributed through thousands of miles of laterals to the thirsty acres. In that land of mysticism, where hoary custom and ancient precedent crush out initiative and smother progress, where no idea can gain currency unless stamped with the approving seal of age, the husbandman still uses implements and methods of a primordial age. He plows with a stick, treads out the grain with a bullock and winnows with the wind.

Irrigation in America is not of modern origin. Spanish explorers in the early part of the 16th century found the Pueblo Indians using the water of the Rio Grande to mature their crops, and there are still extant evidences of irrigation canals in Arizona that were constructed long before Columbus crossed the Atlantic. Seventy years before the English established their first permanent colony on this coast, Spanish missionaries irrigated their garden patches along the Rio Grande.

The Anglo-Saxon pioneers in irrigation in this country were the Mormons who constructed a project in Utah in 1847. A little later, the Horace Greely colony in Colorado followed the example of the Mormons. From this small beginning, irrigation has been extended in that state until at the present time, 1,853,000 acres are being watered; while it is estimated that there are approximately 2,300,000 acres

NOTE.—Owing to limited space in this issue, many papers not printed in full will be presented to readers in future numbers of the AGE.

more that can be reclaimed with the available water supply. Immense as is the mineral production of Colorado, the output of its mines is equaled in value by the agricultural product of the state.

It is estimated that about 13,000,000 acres were irrigated last year in the states west of the Mississippi and that there is water which can be utilized sufficient to reclaim over three times as many acres more. Fully 10,000,000 acres of the total area now watered are under privately owned projects or ditches. For the most part, these have been constructed in such a manner that a great economic waste has been involved both in the cost of building and in the application of the water. In this latter particular, a large saving can be effected by the adoption of more scientific and intelligent methods, which would permit of largely extending the area watered.

Under irrigation, the tendency is to restrict the size of the farm unit. Experience teaches that in most irrigated sections it is impracticable to cultivate large single holdings. As a consequence, the average farm under ditch will be much smaller than in the humid regions. Thus provision will be made for a greatly increased farming population, with a corresponding increase in the production of farm products, thereby adding immensely to the country's wealth. Since irrigation is an insurance against crop failure, the farming industry will be greatly relieved from the element of chance and become far more stable, which, in itself, will represent a great economic gain.

In 1908, 260,000 acres of land were irrigated in this state. At present there are projects under construction which, when completed, will cover 390,000 acres additional, 327,000 acres of which are under government projects. Owing to the character of the soil in the semi-arid regions of this state, which is a volcanic ash and disintegrated basalt, and the long growing seasons, irrigated lands in this state produce abundant and highly excellent crops. Practically all of this land is particularly adapted to the growing of the hardier fruits; apples attain a peculiar perfection. This, with our excellent transportation facilities which give ready access to the markets of the country, enable the horticulturist to secure annual profits from irrigated lands.

In this respect, Washington is excelled by no other state, and irrigated lands bring values equal to the best prices paid even in California. Depending upon the location relative to transportation and the particular crop grown, these lands bring, when improved, from $100 to $2,000 an acre. These are not speculative prices, but, on the contrary, are based upon the actual returns derived from the land.

The amount of land that can be irrigated in this state is limited only by the available water supply, and in time many thousands of acres of this rich land will be reclaimed. Owing to the exceptionally high productive capacity of the land under intensive farming, the farm unit will always remain small. Five acres are sufficient to produce an excellent competence for a single family, and in the older irrigated districts, devoted to fruit raising, a large part of the farms contain but five acres. This gives a comparatively dense agricultural population, and adds greatly to the attractiveness of the industry in these communites, a condition not obtainable in regions where a larger farm unit is required for the sustenance of a family. It makes more practicable the building of good roads, tends to add to the construction of interurban electric lines and the extension of the rural post and the telephone, thus giving the farmer all of the advantages of urban life with the healthful conditions of farm life. These irrigated communities are assured of uniform prosperity since the element of chance in the growing of crops is eliminated.

Owing to the peculiar topography of this state, it has a great diversity of climatic and soil conditions. In the eastern and southeastern portions the high plateaus, containing a deep, rich soil, peculiarly adapted to the growing of cereals, wheat, oats and barley, are the chief products, and millions of bushels are produced annually.

A problem peculiar to the western portion of the state is the reclamation of the arable portions of our logged-off lands. At the present time, there are large areas of fertile acres encumbered with the stumps of giant trees, areas which have been aptly called "The Loggers' Stubble Field." This land in its present state, while capable of producing rich crops, lies waste and unproductive because the expense of clearing and preparing for the plow is beyond the means of the ordinary home builder. The most economical methods of clearing this land now known are too costly to be generally used, even though the land when prepared for cultivation yields large returns on the investment.

Some progress in reclaiming these cut-over lands is being made through cooperative efforts on the part of private individuals, similar to the organizations which first undertook the larger irrigation projects in this country. I am convinced that, if these areas are to be generally reclaimed, aid must be received from the state, rendered, possibly, along the lines devised by the federal government in the reclamation of its arid lands. This is a problem with which this congress might well deal and bend its energies toword working out a practicable solution.

At the last regular session of our state legislature, $8,000 was appropriated to be added to a like sum appropriated by the federal conservation for the use by the bureau of plant industry of the department of agriculture in the United States in furthering the investigation of and experimentation with the various methods of clearing logged-off lands. This is the first practical step taken by this state in the consideration of this problem.

After discussing the policy of conservation as applied to the great natural resources of his state, the speaker closed with an expression of hope for further growth of irrigation congress which, he declared, is most potent in the development of the west.

Mayor Pratt, of Spokane, spoke briefly in welcoming delegates to the city and urged the congress to seek remedy for existing evils in land laws by greater interest in the election of legislators.

In accepting the hospitality of Spokane, President Barstow congratulated the city upon the spirit with which had prepared for the convention and assured its complete success. After reviewing the past work of the congress in preservation of forests and advancing the interest of irrigation, he said, in part:

The great cities are the maelstrom of our nation! There citizens, at large, would soon become effeminate and decayed save as they can draw upon our country and simple life. We are wisely seeking to protect our natural rivers by safe-guarding their sources of supply. How about that river of human beings who have been created, "a little lower than the angels"? Are we averse to making wholesome provisions for its headwaters? There are many evil forces ever at work to drag our nation downward, and these obtain their temporary reward in diverse ways.

The great and sublime purpose of the National Irrigation Congress is to marshal together those forces which will only seek for the betterment and continuity of our nation, and to overthrow those elements in society, which,

"Having greed of life
"Forget to live."

There is too much an unwarranted prejudice by the majority of Americans anent many of the nationalities coming to our shores. There are, no doubt, some of the people of each nationality that are undesirable. But, is this not also true of some of our own people? We are not to judge an entire nation by the overt acts of a few of its members any more than we would have the people of any other country judge us by the ill-advised or criminal conduct of a few of our citizens. Time has shown to the careful observer conclusively, that, whether Huns or Slavs or Italians or Chinese or Japanese, they make good citizens and are most productive in their efforts when located upon land.

Too little attention has been given by the great constituency engaged in our irrigation enterprises of the need of drainage for irrigated lands. The practice of this principle is of great antiquity. No irrigation plant has reached its highest efficiency until a system of well-planned drainage ditches has been installed within its sphere. I believe this matter to be worthy of the serious attention of this congress; and some time could be not better occupied than in a full discussion concerning the drainage of irrigated lands.

One of the most hopeful and cheering signs of the times in accomplishing the work of reclaiming the remainder (or over forty million acres) arid lands in our nation, is, that many of our able and leading financiers and bankers, some of whom come from as far east as Boston, are now realizing the inherent value of irrigation bonds. Such bonds based upon lands and values that are developed to the highest point under irrigation, if properly safe-guarded in the legal aspect of the case, and with wholesome commercial conduct, will certainly address themselves favorably to critical financiers.

I desire to impress upon the mind of this congress the great importance of taking prompt steps to give the Federal government to understand that the voice of the people of our entire nation demands that the reclamation fund shall be forthwith supplemented by the creation and sale from time to time of gold bonds in the total sum of five hundred million dollars ($500,000,000) in order that much more rapid work may proceed in reclaiming the nation's arid lands. This same principle finds its application as to reclaiming our swamp lands and improvement of our natural river-ways. This is no time to halt and disband. But rather to arouse the people of our country to overthrow any and all those men who may seek to emasculate the work so wonderfully and auspiciously begun.

The great west and southwest needs some of the money of the east with which to push forward with rapid strides the stupendous and far reaching work of irrigation which this congress primarily advocates. The irrigation states are operating under both national and state laws, which have stood the test of time. When once all these arid lands shall be under cultivation by irrigation, we shall have given opportunity for about twenty-five million additional population with an annual increase of agricultural products amounting to six billion and five hundred million dollars.

As is the case in all industrial and commercial enterprises, there are to be found in the promotion of irrigation projects some that are unworthy. These cases should be constantly looked after and brought to book by our intelligent and justice loving people, and the strong arm of the government should be exercised to bring every operation of such a character to a just retribution. Along this and other valuable lines the Fourteenth National Irrigation Congress in session at Boise, Idaho, in 1906, appointed a publicity committee of five, Professor Samuel Fortier being the chairman thereof. This committee has already performed much valuable service, and I regard its continuance as most important looking toward broadening the intelligence of all the people, and especially those who are contemplating locating on irrigated lands.

We are gathered here for the discussion of those questions and to take action upon those plans that are not only of national, but of world-wide importance. Their potentiality is such as effects the very vitals of our nation. Their

meaning should be heralded to every home and corner of our nation with no uncertain sound. This congress may have a just pride in its past achievements. This fact should inspire us all to a more noble and patriotic purpose in all our future activity. We have so strongly impressed the mind and conscience of the people throughout our country, as to have caused the enactment of important legislation by the states as well as by the National government, the fruits of which are in evidence throughout the great west and southwest parts of our nation. And now the far east and south is rapidly coming to understand the potential principles for which we stand.

May east, west, north and south join in one grand common purpose and effort to bring every noble influence to bear, so that opportunity may be given to the tens of thousands in our great cities, and that are yearly coming to our shores, to become home-builders upon the lands of our nation, through and by which we shall be laying strong and deep foundations for the perpetuity of our American people. The price of our success is found in patriotism, sacrifice and sound judgment. Families of wealth fall and others rise in their places. Just so with nations. Let these United States hold and increase their moral force and we shall ride safely through whatever storms may assail us from without or within.

At the call for responses from governors of states and territories, ex-Governor Gooding, of Idaho, characterized the congress as a convention of home builders as well as irrigators. He insisted that the work must be continued until the congestion of the cities has been relieved and every acre of arable land had been made to produce something to feed the pople.

Long applause greeted the reading of the following message from President Taft: "I greatly regret that I am not able to be present to hear the discussions and get the benefit of your deliberations. I have the deepest sympathy with the general objects of the National Irrigation Congress, and you can count on my earnest endeavor to further the cause of reclamation by irrigation in every part of the country within the jurisdiction of the Federal government."

Upon the call for responses from the representatives of foreign countries, Dr. Baeta Neves, of Brazil, spoke of the close relationship between his country and the United States, and elicited applause when he presented a Brazilian flag to the convention. Lieutenant Governor Bulyea, of Alberta, explained that in his province attention is gradually turning to irrigation, and that there is promise of great development during the next few years.

The report of the executive committee recommended the adoption of a plan whereby, under the direction of the congress, there shall be continuous and effective effort on behalf of irrigation and the irrigated country. It further recommended the increase of the number of vice-presidents of the organization from three to five in order to take proper charge of the work, and also a provision in the constitution to insure greater continuity and permanence in the work. The report involving these changes in the constitution was adopted.

Following the adoption of a motion to send a message of regret to Fred. J. Keisel, of Utah, who had been unable to attend the congress because of illness, an invitation was extended to the United States senatorial committee on irrigation, then touring the west, to meet with the congress and assist in its deliberations.

MONDAY AFTERNOON.

At the opening of the afternoon session telegrams of regret at their inability to attend were received from Senator W. E. Borah, of Idaho; Isham Randolph, of Chicago; John Farnsworth, secretary Chicago Association of Commerce. President Barstow then introduced F. H. Newell, director of the reclamation service, who spoke as follows:

The present situation in national irrigation is that homes are being provided for thousands of self-supporting citizens at no cost to the taxpayer. Seven years have elapsed since the passage of the reclamation act. Under its operation irrigation works have been built in the thirteen western states and two territories by which waters are conserved and distributed and nearly 700,000 acres already brought under irrigation, with returns to the fund amounting already to over a million dollars. The success obtained may be said to justify the hopes of the most enthusiastic of the early advocates of the reclamation act.

The law signed by President Roosevelt on June 17, 1902, known as the reclamation act, is perhaps the most prominent of the statutes dealing directly with the conservation of natural resources and with the utilization of these in creating opportunities for a large body of citizens to own land in small quantities sufficient for the support of a family. To quote a well-worn phrase, its object is to put "the landless man on the manless land" and to enable his family to prosper by the use of waters which otherwise flow to waste or are destructive to human life and property. The land which otherwise is valueless becomes highly productive through the intelligent application of the water thus conserved and through the labor of the man who otherwise might be unable to employ his energies for the best good of his family and of the commonwealth.

The Nation is concerned in this work, not only because of the resulting internal development, but also because of the improvement in citizenship and in stability of American institutions. The nomadic herdsman, the restless miner and the wandering laborer add little to the strength or safety of the community, but let one of these men become attached to the soil, let him own a small farm which is sufficiently productive to furnish his family with needed subsistence and comfort, and he becomes a citizen who can be depended upon, in season and out of season, to preserve those institutions which we most highly prize.

This result of adding to the productive area of the country and the building up of the highest type of citizenship is brought about by the expenditure of a fund not created by direct taxation nor taken from the pockets of other farmers. The fund is derived from the proceeds of the disposal of public lands acquired a century or less ago and which have been considered almost valueless. These funds are expended in the construction of reservoirs and canals, the water from which is not given away, but is sold at a rate sufficient to repay the cost and to maintain the fund undiminished.

It must not be supposed that the use of this fund alone has brought about a transformation of many parts of the arid region. While the Government has utilized this fund in making homes in localities where otherwise this would not have been done, private capital has also made great advances and possibly at present five or ten times as large an investment in the aggregate is being made by corporations in building irrigation works as is being invested by the Government. Much of this investment, however, has been made possible, or, at least, has been stimulated by the Government work. The fact that the National Government has deemed it wise to take up the matter has been one of the strongest arguments appealing to capitalists to do likewise.

There is no competition as between national and private funds, but rather an attempt at all times on the part of the Government to stimulate legitimate enterprise through obtaining facts upon which investments might be safely made and to avoid taking up such work as could be handled successfully by others. Looking back, it now seems probable that, if the Government had not begun work in each of the western states, many of the enterprises now successful under private auspices would not have been taken up, but on the other hand some of the enterprises on which the Government is now engaged might, if left dormant for several years, have been entered upon by private capital.

The reclamation fund has been larger than was expected, upwards of fifty-two millions of dollars being available to December, 1909, this being twice as much as was foreseen. There have been laid out systems which involve the ultimate reclamation of several million acres. Large works, whose magnitude is such that they have been passed over by private and corporate enterprise, have been built. In all, it may be stated that in round numbers there were ready for irrigation at the beginning of the irrigation season of the present year over 5,000 farms, with an aggregate acreage of 700,000 acres. Storage of flood waters had been created and in actual use to the extent of a million acre-feet. Canals and ditches were ready for use of an aggregate length of more than 3,000 miles, a distance equal to that across the United States. Fifty-eight tunnels had been built of a length of 85,000 feet. Many thousands of smaller structures, such as headgates, flumes, bridges, turnouts, etc., were completed; a thousand miles of telephone in operation, and yardages of earth moved comparable to that handled in the same time at Panama.

More than all this showing of material progress are the excellent results accomplished in carrying out the purpose of the act, namely the making of opportunities for homes. The wise provision of the law restricting acreage has been enforced and there is a well-marked beneficial result in the subdivision of large areas of irrigable land and the placing of this in the hands of men competent to successfully cultivate the soil and make permanent homes. The speculative element has been largely absent.

The works now in hand will require all of the reclamation fund for several years. Each large work is completed to a point where it has made possible hundreds of homes and where returns are coming to the fund, but it has numerous ramifications, or divisions, each of which requires considerable more money for completion. There is no lack of work when these are finished. The opportunities for further conservation of the waste waters are almost unlimited, especially in localities where attempts have been made on a small scale and complications of such nature have arisen, especially those of vested rights, that successful action can be taken only by following up the matter with infinite tact and patience, coupled with the resources of the reclamation fund.

Of course there is always another side to every large problem. It is not conceivable that the reclamation act could be wholly perfect or that its administration could be without flaw. The very benefits brought about by the act have been a source of criticism.

Every great movement and every improvement brings with it an attendant train of evils. The railroad, so necessary to the development of the country, cuts the farmer's land in two, sometimes kills his cow. Year after year there is a heavy toll of injury and death on its employees and, to a less extent, on the traveling public. The mine or the factory, adding to the wealth and comfort of some, has its evils which are a continual subject of study. No advance of mankind is made without pain and sorrow to some one.

The main intent of the reclamation act in bringing about beneficial results to the multitude frequently puts the individual to annoyance and expense. The requirement of residence on the land, or in the neighborhood, is freely criticised as involving unnecessary hardship, and yet this is one of the requirements which the majority of Congress considered as being an essential condition for the advancement of Federal funds.

The slowness of the work is also criticised and it has come to be a matter of general remark that the Government is always slow. This, like many truisms, is a statement which does not stand close analysis. There are very few corporations which have accomplished with the funds available as much as has been carried on by the Reclamation Service, who forget that the rate of construction is limited by the money available and that the original intent of the framers of the act was that large works beyond the reach of private enterprise should be laid out in a comprehensive manner and that portions of these should be built as funds were available, assuming that certain portions or units could be completed well in advance of the demand for homes. This anticipation, however, has not been realized.

From the minute that a large project is outlined and results laid before Congress in the annual reports there comes an insistent demand that all parts be pushed forward so as to let every man obtain water at the earliest possible date. The people are impatient, as they are in a western city, for all of the improvements to be carried on at once, forgetting that revenues are not sufficient. It is as though the settlers in a new town demand that water, light, sewerage, gas and paved streets be built immediately, ignoring the fact that the execution of plans must await the obtaining of revenues and that because plans are made looking forward to a great municipality, it must not be inferred that there is money on hand to complete them at once.

The successful handling of the reclamation fund probably requires as much, if not more, skill and patience than in any industrial enterprise. On the one hand are the settlers clamoring for immediate results; on the other hand are engineering problems and complications of vested rights to water and difficult rights of way, with defective land titles, all of which must be patiently worked out under very exacting regulations. The Federal employee is regarded by all as a proper target, when joined with this is the fact that the man in control of the ditch is as a matter of course regarded by everyone as responsible for every evil in the community and you have a combination which requires almost unlimited skill, tact and self-control.

The reclamation act is not a perfect document, but, like most acts of Congress, is the result of compromise of many conflicting ideas. It is purposely very broad and leaves as many details as possible to executive discretion. Wherever it may be defective, these defects can only be remedied in one way, namely by Congress and not by any official. It is worse than useless, therefore, to attempt to remedy these defects, if they exist, through criticism of the methods adopted by the officials in direct charge. Any needed improvements should be brought to the attention of the law-making body and particularly to the committees on irrigation of the Senate and House, each of which is seeking for suggestions and intelligent advice from practical men.

I might add in conclusion that the Senate Committee has now started on its general trip throughout the West and that they will be in Montana during this week and next. I regret that I cannot stay during the deliberations of this body, but must go east to meet the Senate Committee. I hope when that committee visits the localities in which each of you are interested you will call to their attention anything which may be needed in the way of additional legislation or of improvements which may be made in the Act; remembering, however, that one of the dangers of attempting to amend a general law is that you do not know where those amendments will cease, and that to secure the desired result in one way, may result perhaps in overturning some things which you regard as very valuable. I thank you, gentlemen, for your attention.

Discussion of Mr. Newell's address follows:

Mr. Fairweather: I hear it very frequently, Mr. Newell, that the lands are not being taken up as fast as they should be. How is it?

Mr. Newell: I am very glad to answer that question as to the rate at which land is being taken up. In fact, I would like to do a little advertising of the land. On two or three of our projects we have some land which is available to each of you, and we would be very glad to have you take it. For instance, if you would go to Montana, to the Huntley project, where we have about 200 farms, and where the rate of settlement is three or four or five families a week, there are excellent opportunities, and I think the rate at which they are taking those farms is about as rapid as the development can proceed in the best way. In the same way in Northern Wyoming, on the Shoshone Project, we have about 30,000 acres under irrigation this year, and there are several—I believe a hundred farms or so there. But outside of the Huntley Project in Montana, and the Shoshone in Wyoming, and possibly the Truckee-Carson in Nevada, the demand has already exhausted the supply, and there is no more free government land.

Mr. Boyd, of California: I would like to ask if those lands that are being irrigated under the government system are available to those who have exhausted their privilege of taking homesteads. I do not think the public is clear on that point.

Mr. Newell: I am very sorry to say that they are open only under the Homestead Act, so that they can only be taken by men who have not exhausted their homestead right.

Mr. Fairweather: If I understand you, the land is actually being taken up about as fast as you think it ought to be?

Nr. Newell: I think so. I do not think this rapid taking up of land always leads to the best results. Men sometimes take lands that they really do not want, when they can get them.

Mr. Fairweather: I understand that the money is not to be paid in according to the contract. Are speculators or anybody trying to get land without the work being done on the land?

Mr. Newell: I think not. I think they are generally taking these up as bona fide homesteaders, who desire to maintain a home. They have already paid back about a million dollars, and several million dollars is due or will be due in December of this year. Now, like many other classes, the farmer has so many needs for his money that he is not inclined always to pay for his water until he has to, so that many of them wait until the last moment, until they are liable to forfeit their rights, before they make their payments. But, I believe they will practically all come up and make their payments. The speculative item has come up very largely by the fact that a man cannot live on his land, but must pay back his water right rapidly, as, of course, he is forced to by the working of the act.

Mr. Fairweather: You say there is money due the government that has not been paid in?

Mr. Newell: Yes.

Mr. Fairweather: Are the people that are now paying in, holding that land with the idea of selling it to some one else at a higher price?

Mr. Newell: It is hard to say what their motives may be, although, I thing most of them intend to cultivate the land. You know that under the Homestead Act, if it becomes known that a man is holding a homestead with the desire to sell it, the land office may cancel his entry, so that a man who really wants to sell hardly dares to say so for fear the land office will say, "You are not a bona fide homesteader." So a good many of them are holding, and I think at good advantage to themselves. But I should hardly say that they were speculators as the term is generally known.

Mr. Fairweather: Just one more question. Do you consider that the residence requirement of the act in the law works a hardship on the people? Would you suggest an amendment of the law?

Mr. Newell: That is a question which I should be very glad to have others express an opinion upon. Personally, I believe the homestead requirement is very necessary and desirable. But it does work a hardship, especially where men take up land before the irrigation system is completed. Under the act it has been possible for men to go in and take up homesteads as fast as we make the surveys, and if they are down at the end of a long system they may wait two, three, four and five years for their water, and to those men it is a genuine hardship to be called upon to stay there. Sometimes as soon as they see the surveyor there they go in, and it is a hardship that they must have to say. Nevertheless, the result on the whole is good, and I think, as I believe a majority of the congress do, that it does result in the actual settlement of the land. To illustrate your point, it has been asserted to me, and I would be very glad to have it corrected if I am in error, that in our Shoshone project in Wyoming with, I think, 13,000 acres under irrigation this year, we have more actual residents living on the land and cultivating it than there are in all the other Carey projects in the state. If I am not correct, I want to be corrected. But, I think that that 13,000 acres has more people living on it, more citizens of Wyoming, than the 250,000 acres that has been disposed of under the Carey act.

Mr. Fairweather: If I understand the law, while the people are living there, they are not required to pay any-

thing in regard to the government, any more than the first filing, until they get water.

Mr. Newell: They pay nothing for the filing fees until the water is there, and they have to be two payments back before they are forfeited. That is to say, two annual installments are charged up against them, and that is why one million and a hundred thousand and so is marked up on the government books as due, but not yet collected. They have that leeway in paying for the water.

Mr. Fairweather: They say the field work already is being pushed as fast as is consistent with the experience of the government and with the money in hand to complete the work already begun.

Mr. Newell: That gets on pretty delicate ground. I do not think, frankly, that we are pushing it as fast as good business would dictate, but we are pushing just as fast as we can get the money. Now, it is up to you, gentlemen, citizens and tax payers and voters, to say how fast we shall get money more than the rate at which we are getting it. We are pushing the work as rapidly as we can, but if we had twice as much money we could go twice as fast and satisfy twice as many people. Now, as it is, at the conference at Portland last week of the reclamation service engineers, each man brought in the claims of his particular part of the country, and those claims aggregated $27,000,000 for work that ought to be taken up right away, and we had to shave that $27,000,000 down into $11,000,000, so that after the conference was over each man individually came to me with a tale of woe that he was absolutely ruined if he could not have what he ought to, and felt that I had some particular grudge against him because I did not give him more money. Of course, I was not the man that was handing it out, but I am the man that gets the blame. So that to answer Judge Fairweather's question, if we had more money, we could, of course, complete more work in quick time. Now, we have large investments made which are practically dormant. In Wyoming it is tied up and only a portion of the water being used now. The Gunnison tunnel is just finished in Colorado, and we cannot utilize that to the fullest extent immediately because more money must be had for extending the system. The condition is exactly as it is in your own private affairs or business, where if you had twice or three times as much money you would use it.

Mr. Bennett, of Oregon: Mr. Newell, are we to infer that all of the projects are being settled as rapidly as you think they ought to be settled?

Mr. Newell: They are going forward with that rapidity that all public lands are taken up. Out of 5,000 farm units we will say, there are less than 500 left, those being in Montana, Wyoming and Nevada. Now, the people are taking those up at the rate of two, three and four families a week, about as many as our men on the ground can conveniently handle and point out a desirable location.

Mr. Bennett: One other question, how many of these men that take these lands do you call homesteaders? Do you call a man a homesteader who goes on a piece of arid land—I am talking now about the Hermiston project. Do you call a man who goes on there and pays $350 an acre for the land and $60 more for the water—do you call that man a homesteader?

Mr. Newell: If he takes it up for a homestead, he is legally one. He may be anything else in fact, but under the law he is a homesteader.

Mr. Bennett: Then from your side of it, you exclude the men who buy the land?

Mr. Newell: The private land, of course, that we have nothing to do with.

Mr. Bennett: Is it not true that in a good many of these projects more money is put in private land like the Hermiston project?

Mr. Newell: It is now.

Mr. Bennett: Then you do not consider the Hermiston project is settled as rapidly as you would like to see?

Mr. Newell: We would like to see that private land subdivided and sold and put in the hands of men who will cultivate it in small tracts, but being in private ownership, of course, we have no control over the disposition of it.

Mr. Fairweather: One more question. What is the actual rate that the Government is charging for the land independent of the water, under this plan?

Mr. Newell: The government land is given away. That is to say, the government gives it away under the terms of the Homestead Act, and the government simply recovers the estimated cost of the water.

Mr. Fairweather: And charges just for the filing?

Mr. Newell: Yes.

Mr. Fairweather: And that is all there is to it?

Mr. Newell. That is all.

At the conclusion of this discussion, Prof. E. A. Bryan, of the Washington State College gave an interesting paper on the "Irrigation Situation in Washington," in which he drew a word picture of the topographical outline of the state. Stating that the eastern and western belts had first attracted attention from an agricultural standpoint, he traced the development of other sections of the state and the engineering works now nearing completion for the reclamation of great tracts.

The speaker deplored the lack of co-operation between the state and federal governments in the matter of reclamation work, and suggested changes in the existing state laws to protect the rights of those land owners who had by industry and expenditure of money, increased the value of their holdings, and had taken the first great step toward development of hitherto unproductive land. Further, he excoriated the state and national lawmakers who had refrained from grappling with the problem of providing a legal cure for existing evils. In the discussion following his paper Mr. Bryan declared that an irrigation code for the state of Washington would assist materially in preventing contest and injury to irrigators.

Sledge Tatum, topographer of the U. S. Geological Survey, gave an interesting paper on "The Reclamation of Swamp and Overflowed Lands in the United States." His words were listened to with great attention by delegates from certain southern states, where drainage is an important factor in the reclamation of wet lands. He asserted that the United States government has given serious consideration to great engineering works for drainage purposes, but as yet there is insufficient organization and system for carrying forward the mammoth projects outlined.

In his discussion of the drainage problems confronting South Carolina, E. J. Watson, Commissioner of Agriculture, Commerce and Industry, for that state, said:

> We have fertile soils and fine forests, but both are being hourly irreparably damaged by wanton deforestation. We have magnificent navigable waterways from the heart of our respective states along the Atlantic seaboard, flowing down from the mountain tops and into the Atlantic, but deforestation and lack of proper care are ruining them for every practical commercial purpose. We have thousands of acres of as fertile land as the Valley of the Nile can boast of, which needs only the employment of intelligent drainage methods, to render it habitable and healthy.
>
> In the eastern portion of the United States there are 77,000,000 acres of wet lands, an area sufficient to make an empire as large as the British Isles, an area as large as six of the New England States, New York and the upper half of New Jersey; an area, as some one has said, that would make a strip of territory 133 miles wide, reaching from New York to Chicago, and which, if divided into farms of 40 acres each, would provide homes for 1,925,000 families of people.
>
> But this Empire, I might call it, for when you consider the richness of the soil it is an Empire, is lying idle and unproductive while American citizens are flocking into Canada to seek homes, at the rate, I believe last year, of over 65,000, and bear in mind when we speak of these lands requiring drainage, that the malarial mosquito is not confined to our south Atlantic coast, but is just as common in the wet sections of Minnesota as in the worst sections of South Carolina or North Carolina or Georgia.

TUESDAY MORNING.

When the session was rapped to order an unusually large number of delegates were in their seats. The subject of the session had been announced as "Forestry," and through the early morning hours it had been whispered openly about the hotels and among delegates that Forester Pinchot, fearing official decapitation unless heroic means be taken to direct suspicion at his chief, and thereby delay investigation of operations in the forestry bureau, had planned to hurl defiance at Secretary Ballinger. It was averred that, because of the all-night activity of his agents in preparing for the capture of sentiment for the following day, the morning session

must bring the explosion. An eleventh hour attempt to prevent the airing of personal or political feuds on the convention floor, was notably unsuccessful and pure curiosity prompted the attendance of many who deplored the prospective fray.

In his discussion of the "Taxation of Forest Lands as Affecting Conservation," F. W. Mulkey presented an able paper in which he explained in detail present methods of taxing timber lands and the abuses resulting therefrom. E. T. Allen, United States District Forester, also presented an instructive paper on "Reforestation," but to neither of these numbers could the assemblage give rapt attention because of the unrest and disquiet among conservative delegates, and the exuberance of forestry supporters, over the prospective utterances of the chief forester.

When the president introduced Forester Pinchot as the next speaker, there was prolonged and boisterous applause from certain sections of the hall. Throughout his speech it was noted that these sections were ready at all times with vigorous approbation. Mr. Pinchot spoke as follows:

The first thing we need in this country, as President Roosevelt so well set forth in that great message which told what he had been trying to do for the American people, is equality of opportunity for every citizen. No man should have less, and no man ought to ask for any more. Equality of opportunity is the real object of our laws and institutions. Our institutions and our laws are not valuable in themselves. They are valuable only because they secure equality of opportunity for happiness and welfare for our citizens. An institution or a law is a means, not an end, a means to be used for the public good, to be modified for the public good, and to be interpreted for the public good. One of the great reasons why President Roosevelt's administration was of such enormous value to the plain American was that he understood what St. Paul meant when he said: "The letter killeth, but the spirit giveth life." To follow blindly the letter of the law, or the form of an institution, without intelligent regard both for its spirit and for the public welfare, is very nearly as dangerous as to disregard the law altogether. What we need is the use of the law for the public good, and the construction of it for the public welfare.

It goes without saying that the law is supreme and must be obeyed. Our civilization rests on obedience to law. But the law is not absolute. It requires to be construed. Rigid construction of the law works, and must work, in the vast majority of cases, for the benefit of the man who can hire the best lawyers and who have the sources of influence in lawmaking at their command. Strict construction necessarily favors the great interests as against the people, and in the long run can not do otherwise. Wise execution of the law must consider what the law ought to accomplish for the general good. The great oppressive trusts exist because of subservient lawmakers and adroit legal constructions. Here is the central stronghold of the money power in the everlasting conflict of the few to grab, and the many to keep or win the rights they were born with. Legal technicalities seldom help the people. The people, not the law, should have the benefit of every doubt.

Equality of opportunity, a square deal for every man, the protection of the citizen against the great concentrations of capital, the intelligent use of laws and institutions for the public good, and the conservation of our natural resources, not for the trusts, but for the people, these real issues and real problems. Upon such things as these the perpetuity of this country as a nation of homes really depends. We are coming to see that the simple things are the things to work for. More than that, we are coming to see that the plain American citizen is the man to work for. The imagination is staggered by the magnitude of the prize for which we work. If we succeed, there will exist upon this continent a sane, strong people, living through the centuries in a land subdued and controlled for the service of the people, its rightful masters, owned by many and not by the few. If we fail, the great interests, increasing their control of our natural resources, will thereby control the country more and more, and the rights of the people will fade into the privileges of concentrated wealth.

There could be no better illustration of the eager, rapid unwearied absorption by capital of the rights which belong to all the people than the water power trust, not yet formed, but in rapid process of formation. This statement is true, but not unchallenged. We are met at every turn by the indignant denial of the water power interests. They tell us that there is no community of interest among them, and yet they appear year after year at these congresses by their paid attorneys, asking for your influence to help them remove the few remaining obstacles to their perpetual and complete absorption of the remaining water powers. They tell us it has no significance that the General Electric interests are acquiring great groups of water powers in various parts of the United States, and dominating the power market in the region of each group. And whoever dominates power, dominates all industry. Have you ever seen a few drops of oil scattered on the water spreading until they formed a continuous film, which put an end at once to all agitation of the surface? The time for us to agitate this question is now, before the separate circles of centralized control spread into the uniform, unbroken, nation-wide covering of a single gigantic trust. There will be little chance for mere agitation after that. No man at all familiar with the situation can doubt that the time for effective protest is very short. If we do not use it to protect ourselves now, we may be very sure that the trust will give hereafter small consideration to the welfare of the average citizen when in conflict with its own.

The man who really counts is the plain American citizen. This is the man for whom the Roosevelt policies were created, and his welfare in the end to which the Roosevelt policies lead. As a nation we are fortunate at this time in this fact above all others, that the great man who gave his name to these policies has for his successor another great president whose administration is most solemnly pledged to the support of them.

I stand for the Roosevelt policies because they set the common good of all of us above the private gain of some of us; because they recognize the livelihood of the small man as more important to the nation than the profit of the big man; because they oppose all useless waste at present at the cost of robbing the future; because they demand the complete, sane and orderly development of all our natural resources, not forgetting our rivers; because they insist upon equality of opportunity and denounce monopoly and special privilege; because discarding false issues, they deal directly with the vital questions that really make a difference with the welfare of us all; and most of all, because in them the plain American always and everywhere holds the first place. And I propose to stand for them while I have the strength to stand for anything.

Before the prolonged and tumultuous applause had subsided, ex-Governor Pardee, of California, was upon his feet declaring that there could be no criticism of the admirable papers just read, and asserting that praise "would be absolutely supererogation." He then hurried the convention into consideration of the time for limiting the presentation of resolutions, thus preventing discussion on the paper presented by the chief forester.

Following the disposition of this question R. E. Campbell, of the Forestry Branch of the Department of the Interior, Canada, presented a paper on "The Forests of Canada and Their Relation to the Water Supply." Nikola Kaumanns, Imperial German Agricultural Attache to the United States, gave an address on "The Importance of Forestry in General," and Mr. George S. Long followed with "The Attitude of Lumbermen Toward Forestry." E. M. Griffith, State Forester of Wisconsin, told of the effects of deforestation in that state, and related the steps now being taken by Wisconsin toward reforestation.

TUESDAY AFTERNOON.

The Bay State Glee Club gave several selections, after which J. E. Chilberg, president of the Alaska-Yukon-Pacific Exposition spoke a few words, extending an invitation for irrigators to visit the exposition. Dr. W. J. McGee, Secretary of the Inland Waterways Commission, gave an address on "Water as the Basis of National Prosperity," and was followed by J. N. Teal, of the Joint Conservation Committee, who spoke on the subject "Deep Waterways for the Pacific Coast." Alex. McPherson, Secretary of the Idaho State Board of Horticultural Inspection, addressing the convention on the topic "The Duty of Water," insisted that the proper use and distribution of the available supply would increase the Idaho acreage under cultivation by fully 100 per cent.

TUESDAY EVENING.

This session was given to the discussion of good roads by Samuel Hill, president of the Washington Good Roads Association, and a stereopticon lecture by Samuel C. Lancaster, Professor of Highway Engineering of the University of Washington.

WEDNESDAY MORNING.

Varying from the program as previously outlined, the congress received a number of addresses on widely divergent subjects during the morning session. E. H. Libby, president of the Washington Conservation Association, told of the wealth of his state and its growing importance as a wheat raising district. President Howard Elliott, of the Northern Pacific, held the attention of his audience during a concise, yet comprehensive, review of the development of the northwest, and the effects of railroad construction and operation in furthering its great industrial and agricultural growth. Ralph S. Hosmer, territorial forester and chairman of the Territorial Conservation Commission of Hawaii, created great interest by his description of the ancient methods employed for

the irrigation of certain districts in this territory, and the possibilities of development in the future.

After announcing that the constitution as newly adopted by the congress provided for the employment of a permanent secretary to further the interests of irrigation, the president introduced George Otis Smith, director of the U. S. Geological Survey who indicated that much depended upon proper classification of public lands in order to provide for proper conservation of the public resources. He explained briefly the work of the survey in making these classifications.

In his address on "Irrigation in South Dakota," Samuel H. Lea, State Engineer, told of the progress of the work and its results, asserting that present plans, involving no storage reservoirs, must soon give place to more improved methods. In his address on the "Message of the West to the East." F. H. Griswold said:

Suggestions have been made, from time to time, that we ought to find a way to stimulate the movement of foreigners into the irrigated areas, but the larger cities of this country offer splendid fields for such propaganda work, and there is no reason why we should cross the Atlantic. In a city like, Chicago, for instance, hundreds of thousands of prospective land-buyers can be reached.

The cream of American lands, namely those in the rich irrigated areas of the west, should be in the possession of our own people. Given the right sort of inhabitants and every fertile valley that is blessed with water will be developed to the utmost. The future of the irrigated areas depends on the class of inhabitants who settle there. The cities are filled with people who would be far better off, both financially and physically, if they were in the country, and they can be awakened easily to that fact. Today these people are following the customary traditions of city life. The chances are that they live in a rented flat and work in a stuffy office, and the man who, under such conditions, can earn more than he spends is rare. In both places air and sunshine are at a premium. These people could not be persuaded to take up life on a regulation old-time farm, but they could be induced to go into the irrigated sections where the benefits of modern improvements are open to them.

The message of the west to the east is that freedom, health, long life and homes where the necessities of later years can be provided for are to be found in the new country. But, gentlemen, it will be necessary for you to carry your message to Chicago if you want to take advantage of the opportunities that await you there. If you wish to reach the people no way can be more effective than to show them what you have to offer and the opportunity to do this will present itself when the doors of the Chicago Coliseum are opened November 20 for the United States Land and Irrigation Exposition. This will be the only exposition of its kind that has ever taken place. The displays are to be educational, and it is believed that fully half a million people will view them. In conclusion, I can only urge upon you once more that Chicago is both ready and anxious to hear what you have to say. The movement toward the west is only fairly begun, and it will continue, if you give your assistance, until all of your fields are filled.

Following Mr. Griswold's address the congress gave unanimous endorsement to the United States Land & Irrigation congress to be held at Chicago, Nov. 20 to Dec. 4, in the Coliseum. William L. Finley, field agent of the National Association of Audobon societies then gave an address on "The Value of Wild Birds to Forest and Field."

WEDNESDAY AFTERNOON.

After announcing that Secretary Ballinger has been detained but would be present to give his address later in the afternoon, the president called upon D. C. Henny, Consulting Engineer for the Reclamation service, who gave a brief review of the irrigation work prosecuted under direction of the government. He stated that government operations had resulted in greater activity on the part of private interests in the reclamation of arid lands. In discussing new projects, advanced for consideration of government experts, he said that because of the lack of funds, it will be necessary for the government to proceed with the work now in progress in order to secure return of moneys invested and thereby prepare for new projects.

Secretary Ballinger, who had entered the hall during Mr. Henry's address and who was now introduced to the convention, prefaced his address as follows:

Ladies and gentlemen and delegates of this convention, I have just heard read with pleasure the expressions of my chief, the President of the United States. Before leaving the city of Washington, he said to me, "Mr. Secretary, I have sent Secretary Dickinson to Panama to learn the conditions under which the Government is constructing that great international waterway, the great connection of the two oceans, so that he might be the better equipped to administer that feature of his department. I will also ask you to go into the west and become intimately acquainted with the conditions of the Reclamation Service in the reclaiming of the public lands with the moneys in the reclamation fund, and to otherwise learn what is necessary in the proper administration under the law of the functions of your department."

This is my excuse for being in the west. It is not, however, my only excuse, because it was over six months since I have seen my family, which I had to leave under circumstances which were somewhat distasteful to me, to hold an office which I was not seeking.

Continuing with his prepared address, he said:

I believe nothing has done so much to stimulate and bring about the development of the west and its settlements as the policy of the government in connection with free homesteads for landless settlers and the encouragement of exploration in the mineral regions. It is true the great land grants were productive of railroad construction, linking the Atlantic with the Pacific and the construction of these railroads was an almost indispensable element in the progress of settlement west of the Mississippi river. Since the adoption of the homestead and mineral laws the public lands have been considered less of a direct national asset than as a means for the advancement of our people and the encouragement of agricultural, industrial and commercial growth.

Up to the last decade it was not fully apparent that the vast resources of the government in the public domain were rapidly disappearing, and that for settlement nothing but arid and semi-arid lands would be left; that the forests and streams and coal deposits were beginning to be the prey of speculators, and the government's title therein divested by fraud and criminal devices. The necessity for the conservation of public utilities had not ripened into a conviction that the government owed any responsibility either to the present or to future generations.

In reference to the forests particularly, tremendous loss existed, not only from fires, but from the wasteful methods of logging and of manufacturing. Under pioneer conditions wastefulness on account of the necessity for existence may have its excuses. The pioneer could not eat the timber, and what may now appear to have been reckless prodigality may have been at the time abject necessity; nevertheless, waste is always to be deplored, and true conservation of all our natural resources means the elimination of wants so far as possible, and the production of the greatest utility for the greatest number. The protection of the great watersheds of the mountain ranges from being denuded of their forests so that the streams may flow through their courses and carry water to the arid lands of the plains is of vital necessity in the reclamation of these lands.

The nation is therefore to be congratulated that even if not seasonably undertaken, we have now entered upon a period of rational protection and of saving of its resources in the public domain. You may be assured that all the energies of the government will be put forward to make effective the means necessary to accomplish this result.

Appreciating the necessity of further development in encouraging the settlement of the west upon lands which without irrigation were uninhabitable and fit only for grazing (and that to a very limited extent) congress in 1902 adopted the method of appropriating the receipts from the sale and disposal of public lands in certain states and territories to the construction of irrigation works for the reclamation of arid and semi-arid lands. The wisdom of this measure could hardly have been fully recognized by those who were responsible for its enactment. It not only committed the government to the great work of irrigating the arid lands, but it furnished an example and stimulant to private capital and enterprise to enter upon this development wherever capital could be secured.

While the government has invested over fifty million dollars in irrigation works, many times that amount has been invested since the passage of the reclamation act by private enterprise, and it is safe to say that a large portion of these private investments have resulted from governmental example and encouragement; and let me say here that it has not been and is not the policy of the national government in the administration of this act to hinder or interfere with the investment of private capital in the construction of irrigation works, but rather to lend it encouragement. This is particularly true in reference to irrigation under the Carey act in the various states.

I am not a believer in the government entering into competition with legitimate private enterprise. Its functions under the reclamation act are not of this character, and I am sure that when private enterprise has done what it can there will still be thousands upon thousands of acres of public lands reclaimable only by government aid. The western states should therefore be very jealous of the perpetuity of the reclamation fund and of its constant increase.

The purpose of the reclamation act is to undertake the irrigation of arid and semi-arid lands where a considerable portion thereof belongs to the public domain, and by the installation of the storage and diversion of available waters to irrigate the largest possible area within a given territory at the least cost to the entrymen and land owners for construction, maintenance and operation, always keeping in view the matter of the settlement of these lands, and rendering them capable of supporting the greatest number of families. While it is a reclamation act, it is also a settlement act, and the public lands which are proposed to be irrigated by means of the contemplated works have been rendered subject to entry only under the homestead laws in small tracts capable of supporting a family. It is declared by the act that only the cost of construction and maintenance shall be repaid to the government. No consideration of profit or direct advantage to the government is intended, and in this the statute does not trench upon the rights of

private enterprise, particularly so long as the reclamation of public land is the main object of the government.

The law is a beneficent one; it is another evidence of the broad and liberal policy which has ever actuated our national government in the disposition of its public lands. It differs, however, from the simple homestead law in that it holds out inducements only to men of sufficient industry and capacity to carry the added burdens of construction, maintenance and operation, which is the cost of the lands. While it is possible that persons of limited means may successfully enter and acquire irrigated lands, it will generally be found that it is not a poor man's proposition, unless coupled with intelligent industry in agriculture.

The whole scheme of the act is based upon the appropriation of the proceeds of the sales of public lands in certain states and territories for the construction of irrigation works for the reclamation of arid and semi-arid lands therein. No further appropriation by the government is intended, or can be inferred from the act, and the responsibility for the disbursement of the funds and the construction of the works is placed upon the Secretary of the Interior. It must be recognized that the government is acting in the nature of a trustee for the people in the disbursement of this fund; that it must construct the works for the settlers and turn them over at cost, and has no right to recklessly or improvidently waste the fund; that cost means the cost which is incurred in the exercise of common business prudence, and this is likewise true of the expense of maintenance and operation.

It is also the declared purpose of this law that the Secretary of the Interior in carrying out its provisions shall proceed in conformity with the laws of the states and territories wherein the irrigation works are situated and is bound by these laws in respect to the appropriation and use of the waters therein.

The government, as I have said, has invested fifty millions of dollars in reclamation works, and by such investment has succeeded in irrigating over a million acres of arid lands; and it may be likewise stated with fairness that more than fifty million dollars have been added to the value of these lands. With the additions which are contemplated in the completion of irrigation works now under construction and those contemplated, the increase of values will more than proportionately continue and the consummation of the revolving fund brought about by the return of the cost of construction of present works will enable the government in the course of years, where feasible projects exist, to increase beyond calculation the wealth of the irrigable regions and the continued expansion of opportunities for settlement and for homes; the end to be reached only when irrigable lands cease to be available.

Lands that may be considered under present methods non-irrigable, in the development of mechanical and electrical capacity for raising water onto higher levels may be economically irrigable in years to come, so that no one can today define the limits of possibility, as they are not the limits of conceivability. This fact has been well illustrated in the history of the public domain, as it has not been many years since the arid and semi-arid lands of the west were considered worthless and denominated "desert lands."

Thousands of acres of these lands, considered non-irrigable, and valuable only for grazing, are now being entered and utilized for dry farming as authorized by the act of congress known as the "enlarged homestead act."

Any one who has visited one or more of the reclamation projects now in operation and sees on the one hand the desert covered with sage brush, and barrenness, and on the other, the water flowing over the fertile soil producing heavy crops of grain, or orchards in fruit, appreciates to the fullest extent the benefits of irrigation.

The people of the west, therefore, who are familiar with these wonderful results in irrigation are highly appreciative of the importance of the reclamation service, but the great difficulty which that service encounters is in finishing the projects now undertaken as against the clamor for a diversion of the funds to new fields. In this respect the service has suffered in not carrying to completion a less number of projects than it is now engaged in constructing.

I cannot conceive of anything which will contribute more to the permanent wealth and prosperity of the reclamation states and territories than the continued construction on the broadest possible scale of irrigation works.

The danger, which the government is undertaking to overcome, is the establishment of small irrigation projects in localities where by such establishment the larger opportunities are destroyed, thus preventing enormous areas of lands from ever acquiring the use of water. It is quite true that many small projects capable of being financed by men of limited means can be carved out of larger possibilities, but to encourage them means the loss of the larger possibilities.

For lack of funds the government is at present often required to surrender possibilities in water appropriation which means an enormous loss in future development of irrigation works, and I fear this is not fully appreciated. It is for this reason that at times private enterprises are disposed to contend that the government is obstructing their interests, while from the larger view their interests are obstructing greater possibilities for larger areas of irrigable land. I may mention here what has frequently occurred to me as a source of advantage both to the states and the federal government, and that is the securing from the various states of uniform legislation in the matter of the appropriation of water and its beneficial use, and also legislation looking to the control and conservation of all available water power.

This congress could accomplish no greater work beyond the stimulation of interest in the development of irrigation than to secure uniform water regulations in the states, and also uniform legislation affecting interstate waters.

Ours is a nation of busy people, a nation of great resources and possibilities, and most favorably situated for trade and commerce. Its wealth is greater than that of any single country, even of France and Germany combined, and this wealth is increasing at a fabulous rate. Much of it has been accumulated by the destruction, by the sacrifice and waste of nature's gifts, and it is a fortuitous circumstance that the country has been brought to understand the importance of utilizing and saving our natural wealth and making it possible for the nation to continue to prosper, and for the generations that are to come to have some share in that prosperity, especially since no element of the nation's wealth is greater than that contained in the soil. For this reason, if for no other, the work of reclamation of the arid and semi-arid lands of the west is worthy of first importance in the development of the nation's resources. Every acre of irrigable land will be needed in the nation's economy.

In a century we have passed from a purely agricultural country to an industrial and commercial country, but we have not outgrown the necessity for agriculture. We have, of necessity, maintained agriculture, and have added to our national activities, industrial and commercial progress to a wonderful degree. The wealth of the nation embraces every product of labor which contributes to the needs of man. The dormant wealth in national resources means only resources available to create wealth by intelligent effort, and I trust our people will never be called upon to look with fear upon the couplet of Goldsmith:

"Ill fares the land, to hastening ills a prey,
Where wealth accumulates, and men decay."

Mr. Fairweather of California: Mr. President, I would like to ask Mr. Secretary one question. Mr. Secretary, if I understood you right in your address, you spoke as if the taking of a homestead under the Reclamation Service was not a poor man's job.

Secretary Ballinger: The thought I intended to convey to you was that ordinarily speaking, it is not a poor man's job, as the cost of construction, maintenance and operation is sometimes beyond the capacity of the poor man to carry unless he couples with that industry and the power of agricultural development.

After the reading of a message from J. J. Hill, of the Great Northern, congratulating the congress and advising that the next gathering be held at Chicago or St. Louis, A. C. Campbell, of the U. S. Department of Justice, gave a talk on the legal view of water rights. Ex-Governor Pardee, of California, followed with an arraignment of railroads, which, by refusing sale of lands granted by the government had impeded the progress of agriculture in the west. It is known that the speaker, by the publication of interviews in the Spokane papers, had prepared for an attack upon Secretary Ballinger and his release of government lands, and much interest centered in these parts of his address:

I am one of those rather old-fashioned people who believe with Roosevelt that the time to do things is now and let us talk about them afterwards. I believe with him that to withdraw, for instance, from entry those lands which take with them power sites and to hold them for the benefit of the people, is a thing for the government of this country to do.

Much to the surprise of the people who were interested in those things in this country, almost immediately after his introduction into office as secretary of the interior, Mr. Ballinger put back into public entry those various parcels of land which embraced a water site, and within eight days, or within a very few days after the order had been made, most, if not all of those sites had been grabbed, by whom? By the people who will use them for the future benefit of the people of the United States?

I am informed that he did this because there was no specific law by which the secretary of the interior could do those things; but Garfield did them. The then president of the United States patted Garfield on the back for having done that, and the present president of the United States, fortunately after the damage had been done, ordered the secrtary of the interior, Mr. Ballinger, to withdraw again from public entry those lands which were left and had not been grabbed because they did not contain power sites—and let me say that Mr. Taft, before he became president of the United States, had quite a reputation among the common, every-day, ordinary people of the country as being quite a lawyer.

In rendering these decisions, the present secretary of the interior, Mr. Ballinger, has reversed his predecessor, Mr. Garfield, whose loyalty to the principles of government reclamation has never been questioned. It is true that Secretary Ballinger made his ruling on the ground that there was no specific law which permitted his predecessor, Secretary Garfield, to thus withdraw from entry public lands. But it is not to be denied that Secretary Garfield and his legal advisers thought he was acting within the law, and that the president, Mr. Taft, has ordered that no more of the lands Mr. Garfield withdrew from entry shall be restored to entry until an executive order to that effect has been made. And Mr. Taft, before he became president, had quite a reputation as a lawyer.

At the conclusion of Mr. Pardee's address, ex-United States Senator Turner took the floor:

Mr. President and gentlemen of the convention, I have very rarely heard an address in a public assemblage of this kind which seemed to be in such questionable taste as that just delivered by Governor Pardee of California. To come here immediately after the delivery of the address by Mr. Ballinger, and criticise him for acts done by him under the sanction of his oath of office seems to me to be unworthy of this great gathering and of the position which Governor Pardee has heretofore occupied in the public life of the nation.

Governor Pardee's address follows the lines of his interview in the morning paper, and a free translation of that interview is that it is the duty of the public officials of this country to act first and then investigate the law afterwards. He says that was the policy of the officials under the Roosevelt administration. Governor Pardee, I respectfully deny that that is true. I do not yield to anybody in my admiration for Theodore Roosevelt. I followed his administration and approved of every act which he ever performed, but I do not believe that President Roosevelt ever consciously acted upon the proposition that he would do something first and then look into the law and the constitution afterwards for the purpose of seeing whether it could be justified; and I say that Governor Pardee in advocating any such a proposition as that is advocating something that is wholly and totally incompatible with free constitutional American government.

When one of the members of the cabinet of the president of the United States is called on to act officially I say that it is due to him to look at the constitution and the law first and act afterwards, instead of acting first and looking at the constitution and the law afterwards.

It was not until the Thursday session that this controversy was again thrown into the convention hall. At that time, Director Smith, of the Geological Survey, submitted a statement bearing upon the discussion, declaring that he did not intend to discuss the motives of his superior nor to inquire into the motives that had brought about wholesale publication of misstatements on this subject. In his statement he further declared that wherever lands had been restored to entry in April of this year by Secretary Ballinger, in the following month withdrawals were made amounting to 154,126 acres, and that this reduction in acreage was inspired solely to exclude from the power site withdrawals, patented lands and all areas not essential or useful to power development.

In answering the statement that "most, if not all, of these power sites had been grabbed," he showed that the press story declaring that 15,868 acres had been entered had shrunk to 158 acres when investigated. He submitted conclusive evidence that there had been but one filing in the Bozeman land office between the date of the restoration and withdrawal order by the secretary of the interior. Desultory discussion resulted after this authorative statemeint had been made. Mr. Pardee endeavored vainly to fortify his position made untenable by the facts as presented.

After Gov. Pardee had intimated that his information as to filings appeared more reliable than the statement of the government expert, he was subjected to the following questions:

A. C. Campbell: Governor Pardee, I understand, from your remarks that you make the innuendo that the Land Office records of Bozeman have been altered or falsified?

Gov. Pardee: I made no such innuendo.

Mr. Campbell: Did you, Governor Pardee?

Gov. Pardee: I did not.

Mr. Campbell: What did you mean by saying at that time that the records showed so and so? Did you mean that the records were falsified?

Gov. Pardee: I mean to say that my informant, who is here and is ready to back up that word to you to this Congress, that he informed me that at that time the records of the Bozeman office, Land Office, did state what I have stated.

Mr. Campbell: Then, sir, you should take that evidence to the United States attorney of Montana or you should withdraw your charge.

Gov. Pardee: At the present time, Mr. Campbell, I have made no charge. If you consider that I have made a charge, I do now at this time withdraw it.

Mr. Ray of Washington: I would like to put a categorical question to the honorable director of the Geological Survey. Has there been any power sites lost since the honorable secretary of the interior went into office? That is the question.

Mr. Smith: I think the question is very well put as to how many, if any, power sites have been taken up in the period between restoration and the subsequent withdrawals. I believe that dates are essential in this proposition. The disputed filings on three or four forties in Montana were or were not made on June 11. They were not made between the time of the restoration on April 10, and the subsequent withdrawal of all the power sites that existed within those areas, to the best of our knowledge, and we took this matter up with great care. You understand that the restoration was made on April 10, and the withdrawal was made on May 29. So I think it is a question of dates. Therefore, the entries or filings under the law—under the order by the secretary of the interior—could not be made if those areas were included in the subsequent withdrawal. If they were not included in the subsequent withdrawal, it was done for no other purpose than on the belief on the part of the experts of the geological survey that were called into this matter, that they in no wise had to do with any power sites.

Further, I wish to say to my good friend from California that when the time comes that the issue arises, between obedience of orders from my superior, and my duty to the American people, in whose service I am, I do not obey those orders. I need not assure you that that issue never arose during my service under Secretary Garfield, and I will also state most positively that that issue has never arisen under Secretary Ballinger, but whenever that issue does arise it will be announced at least in the local press of the capital city of Washington in the form of my resignation. I owe my chief allegiance to the American people and I welcome their criticism.

Following the Wednesday discussion over Secretary Ballinger's official acts, John H. Lewis, state engineer of Oregon, gave an address on "Oregon's New Water Law," showing that the statute had been adopted in February, 1909 and had for its object the settlement of water titles through the offices of the state engineer and the division superintendents of the two sections of the state. The speaker showed that the new code has met with popular favor and is accomplishing its object.

THURSDAY MORNING.

Three addresses given at the morning session were of special interest to delegates and both were freely discussed while numerous queries indicated that there were many who desired more detailed information. Dr. A. C. True gave a comprehensive review of the scope and purpose of the irrigation investigations of the United States office of experiment stations. Inquiries developed the fact that stations are maintained in every western state with a view to investigating conditions in the irrigated sections.

Delegates from eastern states were interested in the address by Samuel Fortier, chief of the irrigation investigations of the U. S. Department of Agriculture, on the subject "The Proper Use of Water in Irrigation." He was occupied for some time, at the close of his address in making explanations and answering inquiries. He explained, in his address, that much importance attached to the use of water after it had been supplied to the fields, and that, in his opinion, about two-thirds of that now used in irrigation is wasted in various ways.

O. L. Waller, U. S. irrigation expert, told of the present laws governing water filings in Washington. He suggested that the state should make careful surveys of all available water supplies within its boundaries and by a careful record of filings would thereby be enabled to protect present holders of rights and prevent the encroachment of new claimants.

Other addresses given at this session were: L. H. Bailey, director of the New York College of Agriculture, on "The Farm Community"; Mrs. Emma Crocker, "What Women are Doing for Conservation."

THURSDAY AFTERNOON.

John Henry Smith, of Utah, who was introduced as a veteran in the cause of irrigation, gave the opening address for the afternoon and after naming Brigham Young as the originator of irrigation in the west, told of the great natural resources of Utah and its rapid progress in irrigation work. Paul Clagstone, speaker of the Idaho house of representatives, spoke of the submerged lands of north-

ern Idaho, and was followed by W. W. Farrell, of St. Joe, Idaho, who told of his troubles when a water power company had flooded his land by the construction of a dam. During his talk, an effort was made to proceed with the outlined program, but there was immediate objection and Mr. Farrell was allowed to continue at length.

Interest centered in the address by ex-Governor Gooding of Idaho on "The Development of Idaho Under the Carey Act." The speaker averred that much of the present irrigation work in his state had resulted from this law, and through it there had been interested such aggressive investors and builders as Frank Buhl, of Sharon, Pa., Kuhn Bros., of Pittsburgh, J. G. White & Co., of New York, and Trowbridge & Never, of Chicago, to whom he gave high commendation for their activity. The tone of the inquiry, at the conclusion of his paper, indicated the interest that it had awakened.

Mr. Fairweather, California: If I understood you right, Governor, the water rights cost $25 to $55.

Mr. Gooding: $55 per acre.

Mr. Fairweather: And the owner has ten years to pay for it?

Mr. Gooding: Ten years to pay for it.

Mr. Fairweather: What is the actual annual tax outside of that and the running expense? You did not give any figures on that.

Mr. Gooding: I should be very glad if I had a little more time to tell you something about the Carey Act. The success of the Carey Act lies in the fact that every acre under the Carey Act proposition must pay its share of the burden of the development of the project; that is, building the canal, reservoirs and all other expenses connected with it. Every acre must pay its share of maintenance. And also, whether it is in cultivation or not, it must pay its share of maintenance for the operation of the canal. The conditions of the contracts have been that only that land that was in cultivation bore the expense. But in the last four years all new contracts made state that every acre bears its share of the burden of operation, and that is at the rate of thirty-five cents an acre; that is the price.

Mr. Ross, Washington: I want to ask the Governor if in the irrigation of these lands, they require the payment of this tax that is not under irrigation. For instance, if one files on 160 acres of land and only has eighty acres of it under cultivation, if he expects to pay pro rata, or is the annual maintenance put on the entire tract?

Mr. Gooding: If I understand, the question you asked me is whether he pays if it is too high to be irrigated.

Mr. Ross: No, if it is under the project.

Mr. Gooding: If it is under the project and can be irrigated, every acre must pay its share of maintenance. So far as possible, we have to shut out speculation under the Carey Act in Idaho.

Mr. Bond, Ohio: Governor, as a seeker for information, I would like to inquire upon what the different charges of construction upon the various projects is based; if it is computed on their construction charge or upon the desirability of the land?

Mr. Gooding: No, on the construction alone. The engineer is ordered by the State Land Board to make an exhaustive report showing the cost of construction, water supply and all those things, nad upon that and other information which the Land Board can gather the price per acre charged. That is the basis upon which these companies take up the work and agree to furnish water, putting it within half a mile, making it available within half a mile of any legal subdivision and it is upon that that the Board and the company agree upon the price, upon a thorough investigation and report by the state engineer. I will say that our Carey Act projects as a whole have been built upon this plan.

Mr. Fairweather: One thing further, as to the administration. I understand that final proof can be made within six months after water is there.

Mr. Gooding: Yes, when the water is available the company notifies the state when the water will be available in its ditches. The state in turn notifies the settler The company also notifies him, as far as it is concerned, but the settler then must make settlement in six months. He can make final proof and get a patent for the land in thirty days. The state has not required any long residence, because we found it was not needed. I think nothing demonstrates that better than the fact of the great development that we have had in Idaho under the Carey Act. I think I am safe in saying—although I do not like to make comparisons—that on the south side, the Twin Falls project, we have more people and more values in dollars and cents than the general government has got on all its irrigation projects in every state of the union where they required five years residence. I have not overdrawn it very much, and we may have the best of it by considerable. I have underestimated when I have said that on the Twin Falls tract, where there was not a dollar of taxable property four or five years ago, they have a valuation here now, of $25,000,000. I have underestimated it. They have a foundation for values of more than $100,000,000.

Mr. Fairweather: After the settler has received his patent from the state, subject to the lien of the water company, can he secure a loan upon his entry secured by second mortgage?

Mr. Gooding: Yes, we are doing that. He has an equity in the land, of course. It may be all the way from $10 up to $100 and as high as $300 or $400 dollars an acre. They are loaning a great deal of money on all the old irrigation projects, that is, on the Idaho Carey Act projects. The Idaho work commenced about the same time as that of the general government.

R. H. Thompson, city engineer of Seattle, gave a technical address on "Pumping for Irrigation" and was followed by J. S. Dennis, of the Canadian-Pacific railroad on "Irrigation and Irrigation Development in Canada."

FRIDAY MORNING.

E. B. Kienz, secretary of the Niles Chamber of Commerce, Niles, Cal., opened the session with a well prepared paper on "Irrigation by Deep Well Pumping," the plan now in operation in this section of the state. In his discussion, he indicated the problems confronting deep well plan and gave instructive facts concerning modern methods.

Other addresses relating to deep waterways were given by Col. John I. Martin, of St. Louis and Prof. W. D. Lyman, Whitman College, Wash., and John L. Mathews.

Discussion resulted from the report of the committee on resolution but there were no changes from the document as submitted as follows:

Resolved, That the homestead law should be amended so that the entryman upon public land under a government project shall not be required to establish residence thereon before the government is prepared to furnish him water; and that the Honorable Secretary of the Interior be requested to recommend such an amendment in his forthcoming annual report.

Whereas, The amount of money now available or likely hereafter to become available under the reclamation act is inadequate to reclaim the arid lands of the Union,

Resolved, That the president of this congress is authorized to memorialize the congress and the President of the United States to augment the reclamation fund by an annual appropriation of ten million dollars ($10,000,000) for the period of five years, for use under the provisions of the reclamation act, to be converted back into the national treasury in due time by the home builders.

We urge legislation to the end that mortgagees who in good faith have been compelled to foreclose their liens on lands within the limits of such irrigation projects may have a reasonable time after acquiring title to such lands under foreclosure proceedings to dispose of the same to qualified persons under the reclamation act.

Resolved, That we memorialize the Federal government immediately to inaugurate drainage measures for the reclamation of the swamp land and overflow lands of the Union in the interest of public health and the creation of homes, and we urge the co-operation of the state and Federal government to this end.

Resolved, That the better utilization of our waters for water supply, irrigation, navigation and power, demands a unification of the various administrative agencies of the government having charge of the federal regulation and control of water and waterways into a single agency; therefore, we urge upon the congress of the United States legislation looking to the early creation of such agency.

Resolved, That the congress be requested to enact a law providing for the immediate survey and estimates of the cost of reclamation of submerged lands, where the work is international in character, or where part of the territory has been withdrawn from sale by the Federal government, or lies along the banks of navigable lakes and streams.

Resolved, That the National Irrigation Congress co-operate with the several sections interested to bring about broad, comprehensive, yet conservative legislation whereby drainage, deep waterways, and forest conservation, together with the pressing needs of irrigation may be provided during the coming session of congress by bond issue; such bonds to be issued in small denominations bearing a low rate of inter-

est, in order that they may find their way into the hands of the people.

We urge the congress of the United States to extend the reclamation act to the Territory of Hawaii.

We approve of the honest, intelligent and efficient manner in which the work of the Forest Service and Reclamation Service has been carried on, and we are convinced that the work of these bureaus has been to the interest of the small land owner and settler.

We indorse the work of the irrigation investigation branch of the Department of Agriculture, and urge that the states and the Federal government contribute liberally to its support, in order that the water supplies that have been and are being provided for arid lands may be wisely used.

We favor the enactment of laws by the states to regulate the cutting of timber on state and private lands, and laws reforming taxation on timber lands, cutover lands and reforested lands, in order that the perpetuity of the forests may be assured and the flow of the streams be preserved.

We commend, and strongly urge the continuation of the work of the United States Geological Survey, and recommend that more liberal appropriations be made by the Federal Congress for the prosecution of the work of the hydrographic and topographic branches.

Resolved, That there should be no political divisional lines with reference to the right to use water for irrigation or other beneficial purpose in the United States.

We approve the enactment of the water laws by the states along the lines pursued in several western states during recent years. We adhere to the principle incorporated in these recent statutes that the waters belong to the people, and hold that this right of the people is inherent and indefensible. Recognizing the necessity for administering this invaluable possession of the people by state and federal agencies, we deny the right of state or Federal governments to alienate or convey water by granting franchises for the use thereof in perpetuity or without just compensation in the interests of the people.

We recognize the immeasurable importance of the development of navigation throughout the rivers and lakes of the United States in accordance with the comprehensive plan beginning with the 14-foot waterway through the Illinois and Mississippi rivers from the Great Lakes to the Gulf as the main artery of our inland waterway system; and we urgently recommend to the Congress of the United States prompt action toward carrying out this and other great projects for the promotion of commerce.

We hold that there is no more important subject now before the American people than that of irrigation by private enterprise in the several states of the Union; that the industries connected therewith have risen to the first importance among the classes of industries recognized by statisticians, statesmen and the people generally; that definite information, at once comprehensive and detailed, is not now available in any state or branch of the Federal government; and we urgently request that the census office be directed to take account of the industries connected with private irrigation, in order that the people may fully profit by our growing experience.

We reiterate the declaration of the Irrigation Congresses of 1907 and 1908 in favor of establishing national forests in the southern Appalachian and White mountains, and urge legislation for that purpose, preferably through the Weeks bill in the amended form, as it now stands before the Sixty-first congress.

We recommend to the legislature of the several states and to the congress of the United States appropriate legislation to secure forest planting, and the reforestation of lands denuded of timber.

We recommend the work of the Audubon Society; and recognizing the value and utility of birds and wild animals we recommend their careful and adequate protection.

Resolved, That the congress extends its sincere thanks to the State of Washington and the city of Spokane, including its commercial and other organizations, and its citizens, for the hearty welcome and generous hospitality which have been extended to the members of this congress.

Also to Governor Hay and other officials of the state and the mayor and other officials of the city for their courtesy, attention and care for the welfare and comfort of the delegates.

We also express our appreciation and thanks to the governments of Dominion of Canada, Costa Rica, Guatemala, Russia, Germany, Brazil, Chile, Argentine, Japan and China for their interest shown in this congress in the appointments and attendance of delegates to this session.

Also to the press of the city of Spokane and the state of Washington for the consideration and ability shown in the reports of the proceedings.

Also to George E. Barstow for the able and impartial manner in which he has presided over the deliberations of this congress.

To B. A. Fowler for his efficient work as secretary.

To R. Insinger and Arthur Hooker, chairman and secretary, respectively, of the Board of Control, for their untiring and successful efforts in perfecting the arrangements for this congress.

To the Spokane Choral Society and others who have furnished the delightful musical program for this congress.

To the Fourteenth United States Cavalry Band, the Boise High School Band, the North Yakima Juvenile Band, the Glee Club of Worcester, Mass., and the Kennewick Band for their attendance and entertainment they have furnished the congress.

Also the various railway companies and their officials having connections with Spokane for their cordial co-operation, contributing to the success of this congress.

There was no discussion on the report from the committee on permanent organization, it being adopted as presented:

Your committee submits the following nominations for permanent officers of the 18th National Irrigation Congress and recommends their election:

For President—B. A. Fowler of Arizona.

For 1st Vice-President—Ralph E. Twitchell, New Mexico.

For 2d Vice-President—R. W. Young of Utah.

For 3d Vice-President—L. Newman of Montana.

For 4th Vice-President—W. Jones, Fleming, New Mexico.

For 5th Vice-President—E. J. Watson, South Carolina.

For Secretary—Arthur E. Hooker, Washington.

Your committee unanimously recommends Pueblo, Colorado, as the place of meeting of the Eighteenth National Irrigation Congress.

THE LAND OF TAOS.

In some of our recent articles on the Taos Valley in New Mexico, we have mentioned in connection with the agricultural development of that territory some of the attractive features to be found in the valley. The most important of these is the Pueblo of Taos.

Some writer has said that they are simply American Pyramids, and about one ten-hundredth as well known to the Americans as is the sepulcher of Cheops. They are prehistoric, but still in use; they are not tombs of fabulous kings, nor impenetrable secrets of what a world has forgotten more than it ever knew; they are just monuments to human love of home and the human ingenuity of making a safe retreat even in the childhood of the race. In a word, they are the two great communal houses in which the Pueblo Indians of the northermost valley in New Mexico have been making their simple history for probably more than five hundred years.

These Pueblos of Taos stand (as they did sixty-nine years before there was an English speaking resident in the new world) on the two sides of a chuckling trout stream in the lovely valley along a spur of the Rocky Mountains. On the west the great canon of the Rio Grande splits the valley from the timbered uplands to the southern extremity. It is one of the finest landscapes in America and one of the fairest valleys.

The Pueblo Indians, as stated in former articles, have been tilling the soil for hundreds of years without replenishing it in any manner, and it is apparently as productive today as in the early history of that tribe.

The Ranchos Orchard & Land Company, of which Mr. Joe B. Warner, Taos, New Mexico, is manager, has made wonderful strides this year in the matter of developing crops.

Construction Camp of the Ranchos Orchard & Land Company, near Taos, New Mexico.

A large force of skilled workmen have had charge of this development and they have been assisted by Indians of the local tribe who are familiar with primitive irrigation, and are fully capable of handling laterals and doing general irrigation of fields.

We are showing herewith one of the camps which was established early in the year. In the rear of the tent may be seen the virgin sage brush, which is first cleared and burned before breaking of the ground is started. In the distance may be seen the mountain range which is at least twenty-five miles distant from the camp, possibly double that distance.

The Ranchos Orchard & Land Company is desirous of getting in communication with prospective settlers, and offer opportunities in the way of home building seldom equalled. Address A. L. Barker, president, Hopkinton, Iowa.

BASIC VALUE OF IRRIGATION BONDS

The accompanying article—the clearest explanation of the basic value of irrigation bonds—is reproduced from the proof sheets of a book which will soon be issued by the well known bond house of Trowbridge & Niver Co., First National Bank Building, Chicago.
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In discussing with our customers one particular class of securities we seek simply to give information.

We are dealing here with bonds which are not well understood. Irrigation, on a broad scale, is rather a new subject of popular interest. It deals with lands which are arid and yet so fertile that the artificial application of water makes farming immensely profitable. And investors in general are awakening to the fact that the maturity. So one may secure either long or short-time bonds. And the issues are frequently in denominations as low as $100. This opens the way to the small investors in a manner not usual with other good issues of bonds.

As a result, the best selling bonds that we handle today are Irrigation Bonds. A very large percentage of our business is done in them. With the spread of edu-

Palisade, Colorado, Grand Valley. Full bearing orchards in this district sell at $2,000 per acre and upwards. They produce from $500 to $1,200 per acre in a season. Eight hundred cars of fruit valued at $3,200,000 were shipped from here in the season of 1908.

securities based on these projects are of the most desirable class.

With those who know, Irrigation Bonds are already popular. The security behind them is a first lien on the most productive farm lands in America. The interest return is liberal, and higher than it will be when the bonds become better known. The bonds are generally issued in serial form, with widely different dates of

cation regarding these bonds, the demand is increasing—fairly by leaps and bounds. And we feel that we are doing our customers a service in contributing to that education.

But it should be remembered that our attitude always is that of unbiased advisers. We have little reason for urging investors into any particular channels. Our province, as a bond house, is to follow the trend of in-

vestment—to supply what our customers want. Our success depends, and has always depended, on supplying the best securities of the classes in widest demand.

The enormous business of Trowbridge & Niver Co. was originally built up by the sale of Municipal Bonds. In those days, bonds issued by cities, counties, districts and states were in widest demand. These, of course, remain a standard of security. But the popularity of Municipal Bonds gradually lessened the interest rate. Then a very large class of investors sought for a larger return.

For many years we have been among the largest dealers in Public Utility Bonds. These include Railroad, Water, Gas and Electric Light Bonds, Water Power bonds are sold mainly to Banks, to Trust Companies, to Trustees, and to individuals who are careful and experienced investors of money. This fact makes it impossible for any trend of our business to take other than conservative lines.

We suggest these facts to make clear the point that we are not making a plea for any one class of bonds. Our purpose is simply to extend information. If Irrigation Bonds appeal to you, when you know the facts, we shall be very glad to supply them. But, if your preference lies in another direction, we shall be equally glad to meet it.

Nor does this book deal with any particular project. It will merely explain Irrigation projects in general. The

A field of Sugar Beets in the Denver-Greeley District. The farmer gets $5.00 per ton, delivered at the railroad track, and raises from 15 to 23 tons to the acre.

Bonds, Telephone Bonds and bonds on Electric Railways. These, for a time, were our most popular securities, and they still retain popularity. But the very popularity of these bonds, as always, served to lessen the interest rate.

We still handle all these classes of bonds, and in a very large way. We are just as glad to supply them, when wanted, as we are Irrigation Bonds. The fact that Irrigation Bonds form the major part of our business today is due to our customers' preference. There seems to be no large class of bonds giving equal security and bearing so liberal an interest rate. And this, as with other bonds, will adjust itself as the bonds become better known.

It should also be remembered that our business is done with a very conservative class of investors. Our facts about any particular bond will be given in separate circulars upon application.

FIFTEEN YEARS OF EXPERIENCE SELLING RECLAMATION BONDS.

We have had fifteen years of experience in selling Drainage and Irrigation Bonds. These two classes of bonds are essentially similar. One is issued to drain wet land, the other to water dry land. The purpose of both is to supply the funds for reclaiming or improving barren or unproductive lands. And both are secured by a first lien on the land which they serve to improve.

During those fifteen years, we have handled sixty-nine separate reclamation issues in eleven states. Not a dollar has been lost by any investor in them.

Again and again we have seen these barren lands

flourish into fertility. We have seen many lands, almost wholly unpopulated, become dotted with comfortable homes and prosperous towns and cities. In scores of reclamation projects we have watched swamps or deserts change, by drainage or irrigation, into productive lands. We have seen arid lands covered with sage brush and cacti. And we have seen the same land, one or two years later, bearing the finest products which are grown in America.

Every project of this kind for which we sell bonds is made the subject of minute investigation. The officers of our Company have tramped every piece of bonded land on which we have sold securities. We have watched every project through to fulfillment. In this way we have learned, in the course of years, to distinguish between the certain and the uncertain.

We have also learned where new laws were needed for the protection of the investor. And numerous laws of this class have been passed through our influence. We have learned what amount of loan is safe on each separate class of land. We have learned the form of Mortgage or Trust Deed or Contract best suited to protect that loan.

Much of this, for a time, was pioneer work. We were blazing new trails. For instance, when Congress passed the "Carey Act," we spent thousands of dollars to have attorneys work out the best form of Trust Deed. And this form has been employed as a model, by us and by others, for nearly all the projects since.

Thus we have secured our own education and have compiled and tabulated in our office files reliable information, including elevations, temperatures, annual rainfall, run-off, flood periods, slopes, soil analysis and stream gaugings covering a period of years. We have in our library the laws of the various states and everything of importance, both legal and physical, pertaining to the reclamation of agricultural lands. Thus we have built up, in the course of years, a perfect organization capable of passing intelligently upon the merits or demerits of any project, and if accepted by us, to formulate contracts, mortgages and tax liens so as to secure the best protection to ourselves and our customers.

The large number of issues handled by this house has established our pre-eminence in the purchase and sale of Reclamation Bonds.

Our experience, our prestige and our wide acquain-

Dam on the Snake River near Idaho Falls, Bingham County, Idaho, Municipal Irrigation District.

tance in the irrigation sections command for us first consideration when an issue of bonds is to be marketed.

In almost every instance, any proposed issue of Irrigation Bonds is submitted to us before being offered elsewhere. Thus we are able to secure for our customers the cream of the bonds of this class.

Only such as afford absolute protection to the bondholder are accepted by us.

The facts in this book, therefore, relate to selected issues. They should not be applied to irrigation projects in general. We mean no reflection on general bonds of this class. Many very good issues have been sold through other channels. But in this, as in all other classes of bonds, some are better than others. The worth of an Irrigation Bond depends on many things, the measuring of which requires training, experience and judgment. It is desirable, therefore, to buy such bonds from a house

which has wide experience and ample facilities in this particular line of investment.

THREE GENERAL CLASSES.

Irrigation Bonds may be broadly divided into three general classes: Municipal District Bonds, Corporation Bonds on lands in private ownership and Corporation Bonds, issued against lands under the provisions of the Federal law known as the "Carey Act."

Of these three classes of Irrigation Bonds, differing according to the laws in the various states in which the projects are located, each has its special attractions. But all form a first lien on fertile and tillable land. And all, if properly issued, afford the investor more than ample security.

View of a portion of the Milner Dam on the Snake River, Idaho—Twin Falls project (South Side).

We will deal with the classes separately.

MUNICIPAL IRRIGATION DISTRICT BONDS.

These Irrigation Bonds are issued by organized districts, very similar to school districts, for the purpose of purchasing or constructing irrigation systems for their own use.

The bond issue must be approved by a majority of the resident free-holders in the district who have paid taxes the preceding year. The procedure is quite similar to that of a school district issuing bonds to construct a school house, or a municipality issuing bonds to purchase or construct a City Water Plant. The bonds then become a municipal obligation, constituting a first lien on all town and farm properties included in the district.

The interest on the bonds, and the maturing bonds, are paid through the County Treasurer's office, by a tax, levied in the regular way. This tax is usually levied for about 15 per cent in excess of requirements, so as to provide for possible delinquencies.

The value of such bonds, as with all Municipal securities, depends on the population of the district and on the value of the property subject to the tax lien. Many of them belong among the highest grades of Municipal securities.

CORPORATION "CAREY ACT" BONDS.

These bonds are issued by Corporations to reclaim lands segregated from the public domain for the purpose of irrigation and development under the provisions of the Federal Law introduced by Senator Carey, of Wyoming, commonly known as the "Carey Act." The segregation is made by the United States Department of the Interior after request made to the State Land Board and certification of their approval to the Secretary. Bonds issued on such projects are usually made to mature in ten annual installments—one to ten—or two to twelve years.

After these lands have been segregated, the prospective settler must make a contract with the Corporation for a water right before entering upon his land.

Supervision of the system of irrigation is maintained by the state engineers and State Land Board until the entire construction is satisfactorily completed and the system turned over to the settlers.

In this way the settler is guaranteed a perpetual water right with good title. The settler pays 10 per cent of the purchase price of his water right and in his contract gives

a mortgage on the water right purchased, and on his equity in the land to secure the deferred payments.

These deferred payment contracts, which mature serially in from one to ten years, are deposited usually on the basis of one and one-half to one, or $1,500 in such contracts to each $1,000 of bonds so issued. These mortgages and contracts are deposited in escrow with some responsible Bank or Trust Company, designated by us, which acts as Trustee under the issue.

CORPORATION BONDS ON LANDS IN PRIVATE OWNERSHIP.

This class of Irrigation Bonds is issued by a Corporation for the purpose of acquiring or constructing water rights and irrigation systems.

The bonds are a mortgage lien on all of the property owned by the Company. In addition, they are secured by mortgages on the land to be irrigated. These mortgages or trust deeds are given by the farmers owning land subject to irrigation, to secure deferred payments on water rights purchased. Such mortgages are usually in serial form, and they are deposited with a Trust Company, which acts as trustee for the bondholders. For each $1,000 bond issue there usually is deposited with the trustee $1,500 in these mortgages on fertile agricultural lands.

For illustration—Suppose the owners of farms mortgage their land for one-third of its value to obtain a water right. Then these mortgages are deposited with the trustee at the rate of one and one-half to one, to secure the bonds. That means that for each $1,000 bond the trustee holds farm mortgages to the value of $1,500. And those mortgages cover farms worth three times as much. Then back of each $1,000 bond will be First Mortgages on land worth $4,500.

That would seem to be ample security. Yet the bonds are additionally secured by a first mortgage on all the property owned by the Irrigation Company which issues them. As the proceeds of bond issues go into the property, this mortgage on the Company's property is a material consideration.

These farm mortgages are not usually given by owners of large tracts of land. In these irrigated regions, farm land is exceedingly fertile, and small farms intensively cultivated are the rule. A few owners may give mortgages on 160 acres, but far more are owners of 10 and 20-acre tracts.

Dam, Head-gates and Canal of Canyon Canal Company, Payette River Valley, Idaho. This system furnishes water to the Emmet Bench destined to become one of the best fruit sections of the irrigated west.

In buying a water right for his land, a farmer is required to pay 10 per cent cash. He agrees to pay the balance in nine annual payments, with interest. The mortgage on his land is given to secure this agreement. That is why Irrigation Bonds are usually issued with serial dates of maturity. The payments made by the farmers are used to retire the bonds as they fall due. This is a far better plan than the accumulation of a redemption or sinking fund as employed in some other forms of bond issues. The proportion of security in the hands of the Trustee is always maintained until the last bond is paid.

As the early bond maturities are paid, the security behind the balance of course becomes more and more ample,

for the reason that the mortgage is not released until the entire debt is paid.

SUPERIOR TO FARM MORTGAGE SECURITY.

It will be noted from the above facts that an Irrigation Bond has the strength and security of a conservatively margined farm mortgage combined with all the advantages of corporate responsibility. It would be hard to conceive of a more attractive form of investment than well selected bonds of this class.

Farm mortgages, issued not to exceed 40 per cent of the value of farm land, are rightly considered a first-class security. When such farm mortgages are placed with a trustee, and bonds issued against them to not more than two-thirds of their value, the security is considerably increased. And when such bonds are further secured by a mortgage on the vast properties of an Irrigation Company, it will be seen that the protection is fully as ample as the most careful investor desires.

Such is the security lying back of our Irrigation Bonds. It will vary slightly with different projects, but not in a way to greatly affect the security.

The next point to consider is the value and earning power of the land on which the security is based.

THE VALUE OF IRRIGATED LAND.

A mortgage on arid land, to the average investor, appears very different from a mortgage on farm land located in a humid locality. And here is the main need for an education.

Previous to irrigation it is true that this arid land has grown nothing but sage brush and cacti. Its barrenness is quite uninviting. The value of the land is due solely to its grazing possibilities, or to the probability of future irrigation.

But this same arid land, when the water is applied, becomes the most productive farm land in America.

Colorado, which has the largest irrigated area of any state, will serve as an illustration of the productive power of irrigated lands. It should be remembered that all the arable land in Colorado, save that used for "dry farming," is irrigated land. And the farm products of Colorado last year

Cabbages, Melons, Squash, Sugar Beets, Onions, Turnips, Egg Plant, Cauliflower, Grain and Alfalfa—all these grow in the Denver-Greeley district, and find a market right at farmer's door at top prices.

were valued at $143,688,577.

Rocky Ford cantaloupes, grown on irrigated land south of Denver, are famous almost the world over. They sell for $2.50 per crate, while other melons on the same market, grown from the same seed, sell for 30 cents per crate.

Peaches from the Grand Junction District bring from four to six times as much as Middle West peaches.

Fruit lands in the Denver-Greeley District often yield more than $1,000 per acre.

Colorado potatoes are the highest standard everywhere. They are dry and mealy, thin-skinned, free from hollow centers, and they are also enormous yielders.

Colorado stands first in the production of beet sugar. There are nine sugar factories north of Denver and about

an equal number south. Last year Colorado farmers received for their sugar beets over $10,000,000.

Colorado has the greatest canning works in the United States.

Colorado pea-fed pork commands in every market a higher price than any corn-fed pork.

According to statistics of the Colorado State Agricultural College, the Denver-Greeley District—the largest body of irrigated land in the country—produces highest value per acre of any land in the world devoted to general farming.

In California, Oregon, Washington, Idaho, Wyoming and Montana, the irrigated land is among the most valuable and most productive farm land in America.

REASONS FOR FERTILITY.

The marvelous fertility of this arid land is largely due to its richness in mineral salts. Potash, sulphur, lime and phosphorous are found in the soil in abundance. It is estimated that good land in the irrigated districts is ten times as rich in nourishing salts as good land in Illinois.

In humid districts, the rains of ages have washed out a large part of these mineral salts. And millions of crops of vegetation have served to disintegrate the soil. This arid land, on the contrary, is in a virgin state of fertility.

Another reason for large crops and fine flavor is the perpetual sunshine. Arid districts have very few cloudy days. The sunshine and the dry air increases the evaporation from the plant foliage. This increases the circulation of sap, hastens its chemical changes, and increases the nutriment fed to the plant.

But the main reason, perhaps, for abundant and unfailing crops, and crops of the highest grade, is control of the water supply. Every farmer is his own weather-man, and is able to give to each crop just the water it needs at the time when it is needed. He gives little or much water, withholds or applies it, according to the crop or conditions.

In rainfall districts this is impossible. The farmer must take the moisture sent him, and when it is sent. Some crops require little moisture, some require much; yet all of his crops are watered alike. Sometimes he has a drought; sometimes a long rainy season.

Thus every crop is full of uncertainties. The farmer, to be safe, must plant a variety of crops. He must provide for both a dry and wet season, else take very long chances. And the crop failures, due to unregulated rainfall, greatly reduce his average production.

CERTAINTY OF CROPS.

On irrigated land, the farmer may raise such products as he wishes, and know that the crops are certain. He has control of his water supply. He can apply it or stop it, give little or much, as the crop or conditions require. This certainty of crops, and of maximum yield, is one of the greatest factors of value in irrigated land.

Another factor is the depth of the soil. Another the freedom from insect pests. Another the ease with which the land can be cultivated. Another is the higher value of the crops which the land is fitted to raise.

An acre of irrigated land planted in sugar beets will net the farmer four times as much as an acre of Illinois planted in corn.

Land planted in potatoes will bring all the way from $100 to $300 per acre. Strawberries often yield from $400 to $700 per acre. Orchard lands often return $1,000 per acre and more.

One tract of 100,000 acres in Colorado on which we are selling bonds at this writing is located close to Denver. It extends from five to twenty-five miles from this growing city of 208,000 population. This fact makes the land particularly valuable for suburban homes and for truck farming.

For all of these reasons, the value of irrigated land, well located, is exceedingly high. Very often one year's crop is sufficient to pay for the land and water. And the value of this land is advancing at a tremendous pace.

It is safe to say that good irrigated land is worth from three to five times as much as the best rainfall land, measured by production.

Therefore, the liens on farm lands which are back of irrigation bonds are, as a class, more valuable than any that we have in America. And the value of this land, because of its restricted area, often multiplies itself several times over under cultivation.

IRRIGATION BONDS ARE AMONG THE SAFEST INVESTMENTS.

As drainage and irrigation bonds have formed an increasingly large part of our business, the officers of Trowbridge & Niver Co. have spent sufficient of their time in the western and middle western states to closely study irrigation and local conditions generally, and more particularly the projects in which we have been interested.

Again and again we have watched these projects begun, carried out and completed. We have seen the barren land blossom into fertility. We have seen it multiply in value, over and over, until some of it has grown to be the most valuable farm land in America.

Some of this land could not now be bought for one hundred times the amount of the original bonded indebtedness.

As a result of this experience, we are prepared to state that Irrigation Bonds, of the right classes, are among the safest investments we know. They are loans on farm land which is productive and valuable—some of the very best farm land in America. The loans are made, in the right sort of projects, at a very conservative rate. They are repaid by the land owners, usually, at the rate of ten per cent a year. And the bonds, being in serial form, are gradually retired. The security back of the remaining bonds increases with every payment.

Bonds of this class now pay a higher interest rate than one can secure on any large class of securities equally safe. One reason is that the bonds are a comparatively new form of investment. They have only come into wide popularity in recent years.

Our Irrigation Bonds are issued in denominations of $100, $500 and $1,000. This opens the field to the small investor, as well as to Banks and to Capitalists.

We know of no class of bonds which, at present, offer equal security combined with equally attractive income. And it is difficult to imagine, when Irrigation Bonds are gone, what other class of security can be found which embraces so many desirable features.

Still, the purpose of this book is merely to give information. It is not a plea for any one class of securities. We supply what our customers want. But we feel that we owe to our patrons this statement of the facts as we know them. For here is an opportunity, which cannot last many years, to secure an unusual rate of return on an ideal class of security.

IRRIGATION BONDS ARE PAID—NOT REFUNDED.

Unlike the vast majority of bonds, irrigation securities are paid, and not simply refunded at maturity by substituting new issues. Each series is retired as fast as it falls due, by the payment of actual cash.

The great earning power of the lands, and irrigation systems behind them, provides vastly more money than is ever needed to meet both principal and interest.

They are not affected by panics or periods of financial depression.

The manner in which our Irrigation Bonds went through the recent panic has called world-wide attention to them as an attractive form of investment.

To those who are interested, we shall be glad to send circulars and quotations on current issues.

TROWBRIDGE & NIVER CO.

WONDERFUL WATER.

Available water is at times worth its weight in good coin. The farmer, the gardener and the worker everywhere need it. For artifical irrigation as well as for pumping and for sinking deep wells and for mineral prospecting, the machinery and equipment of the American Well Works, Aurora, Ill., is second to none. For handling water on a large scale, their centrifugal pumps are unequaled. Parties interested should write for special particulars suggesting the name of this paper as advising it, the American Well Works, Aurora, Ill., who will furnish free a large illustrated catalogue of well and pump supplies.

Send $2.50 for The Irrigation Age one year and The Primer of Irrigation

Government

RECLAMATION NOTES

Private

Under this heading, THE IRRIGATION AGE will hereafter run reports and news relating to irrigation projects—both government and private—gathered from the various sources at its command. Readers of the AGE are requested to assist the editor by sending reports of local projects, new organizations or progress of outlined work in their vicinities.

COLORADO

It is reported by officials that the Colorado Reservoir & Canal Company and the Mutual Irrigation Company now constructing a system to reclaim about 7,000 acres in the Plateau valley, Mesa county, has nearly completed its operations and will be prepared to supply water for the season of 1910. About $100,000 has been expended by the company, and it is claimed that the land is well suited to fruit and orchard culture.

With a capital of $2,000,000, the White River Trappers Lake & Routt County Irrigation Company has filed articles of incorporation. It is proposed to construct reservoirs in Garfield and Rio Blanco counties and thereby to reclaim more than 200,000 acres in Routt and Rio Blanco counties. The water in the following lakes and streams will be conserved by the new company: Trappers' lake, Marvine lake, Lost lake, Big and Little Beaver creeks, Fawn creek, Shell creek, Milk creek, Spring creek. Hewlett creek and Coal creek. Two corps of engineers already are in the county and have completed their work at Trappers and Marvin lakes. They will move on to the creeks and to Lost lake, completing their work in the course of a few months.

The Thompson-Olmsted Investment Company has completed plans for the irrigation of about 4,000 acres near Hayden in Routt county. Water will be carried by 1,500 feet of steel syphon from Elkhead creek.

Having prepared plans for the irrigation of 30,000 acres near Browns Park in the western part of Routt county, the Browns Park Water Company has been organized with a capital of $500,000. Water will be taken from Beaver creek. Fred T. Henry, F. B. Davis of Denver and Clinton E. Bivens of Steamboat Spring are incorporators.

Sen. Chas. D. Griffith of Denver and E. W. Jackson have purchased 25,000 acres of land about thirty miles east of Denver and are planning the construction of reservoirs. Water will be diverted from Running creek into Dry creek and thence into the system of five reservoirs.

William A. Havemeyer is said to be investigating the Badito Reservoir, Irrigation & Land Company in Huerfano county with a view to becoming interested in the $1,000,000 project. If constructed, the dam will supply water for about 60,000 acres in this county.

Attempts to consolidate the Antlers Orchard Development Company and the Farmers' Irrigation Company at Antlers has met with opposition. Litigation is expected as a result of efforts of stockholders in the latter company to prevent the merging of the two companies.

The South Palisade Heights Irrigation Company has been formed at Palisade and a pumping plant capable of supplying water to 1,000 acres will be installed. Dr. J. W. Gothard is president.

Land owners in the vicinity of Watkins are investigating the advisability of employing pumps to lift the underflow for irrigation purposes.

On August 12 the postal department barred from the mails the matter circulated by the San Louis Valley Land & Irrigation Company. Officers of this company assert innocence of wrongdoing and declare their willingness to submit to investigation by federal officials.

Commissioners of Adams county yesterday made the final order for the creation of a new irrigation district embracing about 40,000 acres of land lying west of the Platte river, which is to be irrigated by the Standley Lake irrigating system, under the direction of the Denver Reservoir Irrigation Company. About 20,000 acres probably will be included in the new water rights.

The directorate of the Two Buttes Irrigation & Reservoir Company, which has a project in southern Powers and northern Baca counties, was recently changed. A. N. Parrish, W. C. Gould and S. L. Harris have purchased the interests of W. D. Purse, H. H. Eberle and Lincoln Bancroft. Surveys for the work as outlined have been completed and the company will proceed with active work.

Commissioners of Adams county are reported to have passed favorably on the application for the formation of the Denver Suburban Irrigation district. It is proposed to issue bonds to the amount of $2,500,000 to complete the work as projected. About 55,000 acres are involved and the election over bonds will probably be held in November.

T. C. Henry and George Henry of Denver have filed at Grand Junction plans for an irrigation system extending from Palisade through Grand Junction to Fruita, which will water 100,000 acres of land. The project will cost about $2,000,000.

The North Poudre Irrigation Company has sold 2,305 shares of the North Poudre Reservoir Company stock to the Uaramie-Poudre Reservoir & Irrigation Company for $175,000. The sale carried with it the control of the company and possession of a number of reservoirs. The combined system will irrigate 125,000 acres of land.

Articles of incorporation of the Pueblo & Rocky Ford Irrigation Company were filed with the secretary of state at Denver recently. The incorporators are W. N. Cox, W. J. Lester and Fred Harris and the company is capitalized at $2,000,000. The company proposes to irrigate 100,000 acres of land south of Pueblo and the Orlando ditch and the irrigation ditches and canals of the Amburson company will be controlled by the new company. A reservoir will be constructed in the bed of the Arkansas river.

A million dollars are to be expended by the Denver Reservoir Irrigation Company to reclaim about 80,000 additional acres in the Greely district, about forty miles northeast of Denver. This will include the purchase of the rights of the Platte valley ditch, the purchase and enlargement of the Milton reservoir, as well as the reconstruction and enlargement of the Gilmore reservoir. This new move by the Denver Reservoir Irrigation Company is to be financed under the direction of the Trowbridge-Niver Bond Company of Chicago.

Preliminary survey has just been completed for the proposed new pipe line to convey water from the Sangre de Cristo range to the San Luis lake, a distance of twenty miles. Ditches from the lake will furnish water for about 30,000 acres of land north of this city. The Kinney & Warner Investment Company are reported to be the financial backers of the proposition.

The formation of the Florida-Mesa irrigation district, adjoining the city of Durango on the south, has just been completed. This district comprises 20,000 acres of fruit and agricultural lands, which are to be irrigated from the waters of the Florida river, a tributary of the Rio Grande. In the organization of the new district the holdings of the old Enterprise Ditch Company have been taken over, and the present water supply will be augmented by the building of a large reservoir up the Florida river, about nine miles east of Durango. The reservoir is to be built of concrete, and will have a storage capacity of about 32,000 acre feet, and will cost between $200,000 and $300,000. The entire project is to be paid for in bonds of the district at $30 per acre, payable in 20 years, and the total cost is to be $600,000.

Louisiana and Illinois capitalists are said to be interested in a plan to carry water from the north fork of the Gunnison river, a distance of about 100 miles from a point near Hothckiss around the Battlement mountains to Grand Junction. Three reservoirs are under consideration. It is estimated that $1,000,000 will be required and that the

work cannot be completed within four years. J. A. Wright, formerly of Colorado Springs, was reported to be promoting the project.

Th state land board recently approved the contract of the Toltec Canal Company of Conejos county, providing for the irrigation of 15,000 acres in that county.

The recent opening of the Gunnison tunnel, Uncompahgre irrigation project, Colorado, and the proposed celebration of the event in September at which President Taft has promisd to be present, has been widely noted in the public press throughout the country. An erroneous impression that there is to be a land drawing at the time of the celebration has been given to newspaper dealers. The fact is that all of the land for which water will now be available is already in private ownership, or has been entered.

CALIFORNIA

Edward N. Prouty, of Berkeley, who represents the Honey Lake Land & Irrigation Company has filed on 660,000 miners' inches of water in the streams near Susanville. Water is to be used in irrigating Honey Lake valley lands.

Land owners at Nogales and Paradise are organizing an irrigation company.

A special election in the Turlock Irrigation district, called for the purpose of voting on a special assessment of $89,000 for care, repairs and maintenance of previously constructed works, resulted in a negative decision.

The recently incorporated Solano-Yolo Land & Water Company, capital stock of $500,000, proposes to construct a power dam at Hell's Gate, west of Winters, and to divert water at the same point by means of ditches, canals and laterals for irrigation purposes in Solano and Yolo. Directors are C. M. Wooster, of San Jose, Harvey S. Loveland, H. H. Sanborn, F. H. Gould, S. R. Chappell, of San Francisco.

The Putah Creek Ditch Company of Dixon is surveying for an extensive system to supply waters to lands in the northern part of Solano county. A. L. Darrow, of Sacramento, and R. E. L. Stevenson, of Dixon, are the principal incorporators.

John J. Mooney, of Tehama county is planning work to reclaim about 3,500 acres of land, which he recently purchased from the Canadian Trust Company.

The Mutual Water Company of Escondido has begun the work of replacing 7,000 feet of wooden flume with rock. Other repairs and reconstruction on this company's system will be undertaken in the near future.

New York capitalists are said to be interesting themselves in a project to carry the waters of the Yuba river from a point six miles above Marysville to a point near Wheatland for the purpose of watering land between these points. It is claimed that work will be begun within a few weeks.

With an authorized capital of $10,000,000, the Sacramento Valley Irrigation Company, an auxiliary of the Delaware Trust Company, has filed articles of incorporation. Incorporators are R. E. Robertson, F. M. Shive and Harry M. Davis, of Wilmington, and it is said that these three own all but fifty of the 100,000 shares of stock. It it said that the company proposes to construct a dam at Clear Lake and irrigate vast tracts of land in Glenn and Yolo counties. Existing and abandoned reclamation projects in these counties and also in Lake county will be combined and revived. Already the company has made extensive purchases of land. It proposes to develop this entire section and is empowered by law to engage in various lines of development work.

It is proposed to extend the Oakdale Irrigation district into San Joaquin county, thus placing water on about ten sections of land not included in the original plan.

Land owners in the northern part of San Joaquin county and the southern part of Stanislaus county are planning to organize an irrigation company to water about 63,000 acres, Engineer H. S. Crow, of Stockton is handling the survey.

Proposing to reclaim 80,000 acres north of Sacramento in Sutter county, R. G. Hanford is organizing a company with local stockholders. Options on land on the north side of the Feather river have been secured.

Reclamation district No. 1 of which C. R. Body, of Yuba City is director, is planning to issue bonds to the amount of $100,000, making a total bond issue of $400,000 or $9 per acre.

Owners of 10,000 acres of land in Paradise, Magalia and vicinity are planning the organization of an irrigation district with a view to securing a reservoir site from the Pacific Gas & Electric Company and having that company supply water for irrigation.

It is reported that Eugene De Sabla, representing the Natomas Consolidated Company, has interested capitalists in his projects, and that he will shortly return to Sacramento to begin active work in reclaiming lands within the properties to be consolidated. Land lies largely in the Sacramento and Sutter districts.

NEW MEXICO

The Ft. Sumner Land Company, of Ft. Sumner, has begun work on a new seven-mile canal to reclaim several hundreds of acres. A pumping plant will be installed and the company will build other canals in future.

Engineers have made surveys for the sixty-five mile canal extending from the Pecos river to the Banajon Mesa and which, with its related reservoirs and laterals will irrigate about 125,000 acres. The project is headed by A. A. Jones and is known as the Jones Irrigation Project. About $1,000,000 will be required to fully complete the work as outlined.

Engineers working under direction of D. A. Camfield, of Greely, Colo., have completed their surveys for irrigation work on the Las Vegas land grant near Las Vegas by which 10,000 acres will be put under water. Mr. Camfield has said to have reached a decision to accept the land grant several weeks ago and to be prepared to begin operations at once.

S. R. Edwards, of Willard, is planning to install pumping plants to irrigate about 2,000 acres.

Reports from Galveston, Tex., state that local capitalists have closed a deal whereby they will invest about $500,000 in a townsite and water rights at Alamogordo, N. M. The water supply will be developed for irrigation purposes.

The Rio Mimbres Irrigation Company, with a capital stock of $300,000, proposes to reclaim thousands of acres of fertile land in Luna county by the building of a reservoir on the Mimbres river, thirty-five miles northwest of Deming, the stored waters to be conveyed down the valley in a great system of canals. The stockholders of the company are A. G. Shalding, Point Loma, Cal.; L. G. Fisher, Frederick Ullman and Walter Page of Chicago, and E. H. Bickford of Lake Valley, N. M.

An irrigation company is being formed at Portales for the purpose of entering into a contract for the construction of a pumping plant to take water from the underflow and reclaim about 12,000 acres. A committee has investigated conditions at Garden City, Kansas, and Phoenix, Arizona.

ARIZONA

It is reported that attempts on the part of the Arizona-Eastern railroad to secure a right of way through the San Carlos reservoir site have been thwarted and that this project will now be pushed to completion. Sligh & Clark are planning work to reclaim about 25,000 acres.

An association has been formed at Phoenix to drill wells for irrigation purposes in the Paradise Valley. By this method, it is proposed to revive the old Verde Land & Power company and water several thousands of acres.

Judge Kibbey, of Phoenix, recently addressed farmers in the Rellito county, giving information about the formation of a water users' association. It is proposed to organize this district to make use of the waters of the Rellito in irrigating about 10,000 acres.

WASHINGTON

Atwood & Webb, of Kettle Falls, are planning to construct a dam for irrigation purposes at a cost of about $35,000.

Reports from Kennewich state that J. M. Spencer, of Plains, Mont., has arranged for surveys to reclaim 550,000 acres of sagebrush land in Grant county. A pipe line to tap the Columbia and reach into the southeastern part of the county via Marcus is proposed. It is said that $5,000,000 will be required to complete the underaking, and that if completed it will be the longest gravity system in existence. Farmers have agreed to a levy of two and one-half cents for the survey. With a prospect of securing water at $20 per acre, it is believed that the project may be bonded for a large sum.

Officers of the Indian bureau are said to be negotiating with Indians who have delayed the government's reclamation work by refusing to sell their lands in the Yakima reservation, and success seems probable.

Settlers living near Moses Lake have formed an organization for irrigation purposes and have adopted the name Moses Lake Development Company with E. T. Guffin as president. For several years crops have been light because of lack of moisture and settlers now propose to construct an irrigation system.

Private enterprise will develop the irrigation project on the John Day and Deschutes river, which the government several years ago abandoned, after having spent thousands of dollars and several years' time, according to a statement made by Dr. N. G. Blalock in connection with the filing of incorporation papers for the John Day Power Company. The papers state that the company is incorporated at $500,000 to generate water and electric power and to supply water for irrigation and power purposes. The land covered lies almost wholly in Oregon and embraces parts of Umatilla, Morrow, Gilliam, Wasco and Sherman counties and part of Benton county.

As soon as owners of 30,000 acres in the Horse Heaven country west of Spokane agree to pay $60 per acre for water rights, it is announced the Klickitat Irrigation Company is prepared to start work on the construction of reservoirs to store water for 600,000 acres in this vicinity. It is claimed that an expenditure of $15,000,000 will be required for the work and that the government has abandoned the project as too expensive. H. A. Hollenbeck, secretary of the irrigation company, is interesting owners of the 30,000 acres in question.

Articles of incorporation for the Hutchinson Irrigation & Land Company, with a capital of $160,000, have been filed with the county auditor at Spokane.

Supplemental articles of incorporation, changing the purposes and intentions of the company, have been filed at Tacoma by the White Bluffs Irrigation Company.

By constructing a dam on the Mad river, J. P. Shotwell, of Cashmere, proposed to water several thousand acres near this place. He has arranged filings on water and is now arranging for the formation of an irrigation company.

Surveys of the extension of the Sunnyside canal so as to furnish irrigation water for the vast tract of land between the Rattlesnake hills and Yakima river, to its mouth and along the Columbia river, have been started by a corps of government engineers detailed from the reclamation service office at Sunnyside, Zilich and North Yakima.

Thirty-three thousand acres of land near the Tieton project in the Yakima valley, Wash., west of Spokane, will be thrown open to homestead entry on December 9. All but 4,000 acres of this tract is school or railroad land and the plan for the entry is such as to indicate that there will be another rush. It was first supposed that the land would come under the Tieton ditch, but has been found to be above the canal. It is valuable, but not irrigable by gravity. Advices from Washington, D. C., are that no settlement can be made after July 29 until November 9, but that on that date settlement can be made on the land with entry on December 9. This is identical with the arrangement of the Columbia river lands, which will be open for settlement September 7.

Steps are being taken at Coeur d'Alene and other points in the panhandle of Idaho to secure the reclamation of 60,000 acres of agricultural lands along the Coeur d'Alene river. Paul Clagstone, speaker of the Idaho house of representatives, is at the head of the movement.

A contract for the construction of a lined section of Sulphur Creek Wasteway, Yakima irrigation project, Washington, has been awarded to George Cooke & Sons of Minneapolis, Minn. This work involves the excavation of about 13,300 cubic yards of material and the placing of about 2,100 cubic yards of concrete and 130 cubic yards of paving. The contract price is $26,248.06.

IDAHO

Homesteaders on the northside of the Payette project, acting under advice of government officials, have made filings on the waters of the Payette river to aggregate 5,000 feet per second and on Boise river of 2,000 feet. A filing was also made on the Payette lakes as a reservoir site. It is claimed that the new filings involve about 50,000 acres in addition to the 72,000 originally planned for irrigation by the government. Filings were placed in the names of the executive committee of the northsiders and is to protect land holders in their water rights providing the government cannot proceed at once with the Payette portion of the project. The executive committee is as follows: Walter R. Cupp, W. B. Compton, W. S. Hawkes, W. B. Sawyer, H. E. Peterson, A. H. Albertson and L. E. Bebb. It is reported that the North Side district will prepare to issue bonds.

Under the direction of the J. G. White Company, the Dubois project will be revived. H. D. Mason, a New York attorney, who represents this company, has filed an application at the Blackfoot land office for the segregation of 350,000 acres under the Carey act. It is proposed to reclaim the land by the flood waters from the Snake river. The application has been approved by the land board.

Three propositions for land irrigation have been presented to the board of directors of the Gem Irrigation district near Caldwell and are now under consideration. Engineer Edward Hedden proposes the construction of a dam across the Snake river above Nampa ferry at a cost of $506,000 with earthwork and other incidentals, costing a total of $908,000. The second was presented by Trobridge & Niver, of Chicago, and specified the conditions under which this company will become interested in the project, and construct a gravity system. The third proposition involved a pumping plant on the river and its operation by electricity transmitted from the Thousand Springs. No decision as to these three plans had been reached before August 15.

OREGON

A new pumping plant has been installed near Tolo for the purpose of supplying water to about 3,000 acres of land. Water is lifted from the Roque river and driven through steel pipes.

The Jordan Valley Irrigation Company has filed on a reservoir site of 1,800 acres at the head of the Jordan valley and is preparing reclamation of land in eastern Oregon and southwestern Idaho. This project will cover land in the proposed government Owyhee project. Construction work will be started this fall.

Articles of incorporation for the Umatilla Irrigation Land Company have been filed at Pendleton. The company proposes to take over the holdings of the Maxwell Land Company at Hermiston.

Judge Bradshaw, of the Dallas, has handed down a decision sustaining the demurrers of the Deschutes Irrigation & Development Company in the three suits against it as instituted by A. M. Drake, Florence Drake and the Pilot Butte Development Company. Suit was instituted to prevent the Deschutes company from using a greater quantity of water than 169 cubic feet per second. Under the Carey act, the Deschutes company has agreed to water 240,000 acres, and the court held that suit to enjoin the company from taking the required amount of water for this purpose was faulty, inasmuch as the state of Oregon was not made a party to the action.

A. M. Crawford, member of the newly formed state land board, has investigated complaints of land owners against the Deschutes Irrigation & Power Company, and

is reported to have declared that the grievances are slight and that the company is conducting its operations in a manner satisfactory to the state.

It is reported that after an inspection and investigation by the state land board, the defunct Columbia Southern project will soon be turned over to a new company recently organized. The old company controlled about 27,000 acres in the vicinity of Laidlow. Legal matters are now being arranged for this transfer.

Projects are being developed for the irrigation of between 25,000 and 30,000 acres of agricultural land in Lane county. Farmers residing on the west side of the Willamette river, between Eugene and Junction City, propose by banding together to irrigate between 15,000 and 20,000 acres while owners of land surrounding Springfield on the east side of the Willamette are preparing to resort to irrigation on an additional 10,000 acres.

Evans, Almirall & Co., of New York, are said to have surveying parties in the field making estimates on the construction of a dam in the Thief valley about twenty miles north of Baker City. It is also proposed to construct a dam on the Balm creek and by these two reservoirs to reclaim about 55,000 acres.

UTAH

Under direction of its board of directors, the Weber Reservoir Power & Irrigation Company has issued a book outlining the project and calculated to instruct land owners in the formation of the proposed irrigation district. It is stated that money is available and that the work can be begun as soon as there is proper incorporation. Davis and Weber county settlers are said to be favorable to incorporation.

For the purpose of financing irrigation projects, a company known as the Irrigation Industrial Investment Company has been formed at Salt Lake with a capital of $500,000. Incorporators are H. S. Woolley, H. P. Clark, Henry Sherman, W. E. Hubbard, Abraham Hanauer and E. R. Woolley.

The Provo Reservoir Company of Heber City has filed an application for sixty feet of water between March and December from the Jordan river. Water will be conducted through the channel of the river to the point of diversion, where a pumping plant will be constructed. It is reported that 32,000 acres will be watered. Officers of the company are as follows: Joseph R. Murdock, president; Joseph B. Keeler, vice-president; Earl J. Glade, secretary; James C. Jensen, treasurer, and Stephen L. Chipman, J. William Knight, Edward D. Clyde, George H. Brimhall, A. J. Evans and David Broadbent, all directors.

The North Branch of the Western Irrigation Company has filed articles of incorporation at Ogden and proposes to extend the canal to the Farr West district at a cost of about $10,000. E. D. Rawson, of Farr West, is president.

The Mosida Irrigation Company, a companion company to the Mesida Fruit Lands Company, has filed articles of incorporation with a capital stock of $12,000. Application is made to take 12,800 acre feet of water from Utah Lake.

Settlers in Emery county are planning to organize a new irrigation district.

Porter B. Fitzgerald and the Fitzgerald Brothers Land Company of Salt Lake have instituted suit against the Irrigated Lands Company and its directors, the Price River Irrigation Company and directors, the Spalding Livingston Investment Company and directors and the Utah Banking Company, to throw the Irrigated Lands Company into the hands of a receiver. Since the muddle in the affairs of the company, work has been suspended on the projects. The Fitzgeralds say that the company is insolvent and want matters adjusted before anything further is done.

TEXAS

A certificate of dissolution has been filed by the Algodon Land & Irrigation Company of Kingsville.

Pelvo, a town located on the Rio Grande in Presidio county, is organizing an irrigation company to divert water from the river and irrigate several thousands of acres.

Plans for an irrigation system for San Saba have been prepared and it is proposed to let contracts for work in the near future.

The Rio Grande Reservoir & Irrigation Company is planning construction of a reservoir near Hidalgo to store water for the reclamation of about 15,000 acres.

George E. Barstow, promoter of the Barstow Irrigation Company, has instituted suit against the company to recover $50,000 in bonds. The head office of the company is at Barstow and it is interested in about 13,000 acres of land in Ward and Reeves counties. Mr. Barstow asks damages of $5,000, the amount the bonds were bid in for by the plaintiff.

The properties of the Gravity Irrigation Company and of the Gravity Canal Company have been sold, the first for $22,605.23, subject to a mortgage of about $45,000; the second for $35,921.60, making a total of $58,526.83 for both properties. Both canals are fed by the same pumping plant and are commonly referred to as the Gravity Canal. These canals have 6,000 acres of land under a contract water rent of $6 an acre. T. J. Poole was the lone bidder and is supposed to represent a syndicate for taking over the property.

DRY FARMS OF MONTANA.

Seven miles from Billings on high bench land, T. J. Bouton of that city, has demonstrated the profitable results of applying dry farming principles in raising grain, says the Dry Farming Congress Bulletin. Mr. Bouton has a number of fields of grain in which the harvesters are at work, one of which is representative of the entire ranch.

This particular field was planted April 20 to durum wheat. The sod was broken only four inches deep, horses being used for plowing and that being the limit of depth to which the plow could be forced without a traction outfit. Mr. Bouton employed a Missourian to take care of this field, a man who had been accustomed to old fashioned methods of farming in the east and middle west. The grain came up with an unusually thrifty appearance. Mr. Bouton instructed the Missourian to keep right on harrowing and the easterner in astonishment told his employer that he would ruin the finest field of grain in Yellowstone county if he attempted to run a harrow over it, but Mr. Bouton, having faith in dry farming methods, ordered the harrowing to continue. The field was harrowed three times after the grain came up, once being after it had headed out. To the astonishment of the Missourian, instead of ruining the field the grain grew more prosperously and promisingly than anything he had ever seen. An ordinary spike harrow was used.

"I endeavored to follow out the suggestions made at the Dry Farming Congress at Cheyenne," said Mr. Bouton, "and I am fully convinced that the so-called dry farmers are right. I believe if I had been able to plow deeper I would have gotten even better results. The samples of this wheat which I am exhibiting were picked at random from the field of 92 acres. The heads are 3½ to 7 inches long, well filled and the kernels are plump and solid. I believe the result will be at least 25 bushels an acre. My other fields of grain show an equally thrifty condition and are proof to me that the only way to successfully raise grain on these bench lands is by conscientiously following dry farming methods."

Secretary Burns of the Dry Farming Congress visited the field described and said that judging from the appearance of the grain it was his impression that Mr. Bouton was very conservative in his estimate of the yield. A sample of this grain has been sent to Prof. B. C. Buffum of the Wyoming Plant & Seed Breeding Company, Worland, Wyoming, for analysis. Samples of Mr. Bouton's crops, including some of the above described wheat will be displayed at the International Dry Farm Exposition at Billings during the Fourth Dry Farming Congress, October 26-28, 1909.

BLUEWATER VALLEY
NEW MEXICO

Worker Gives His Opinion of Land in this Valley—Is a Homeseeker, Not a Speculator—Says "Climate Is Fine, Great Field for Fruit Culture, Poultry Products Bring Fancy Figures, Settlers Speak Highly of Land Company."

The following letter, written by Mr. J. H. Powls of Mendota, Ill., to a friend regarding the Bluewater Valley, New Mexico, containing his impressions after a thorough investigation, is interesting as giving the unbiased views of a careful, intelligent man who is looking for a home for himself and family. Mr. Powls is an engineer on one of the western railroads running out of Chicago. He is evidently a homeseeker and not a speculator and looks at the proposition with an eye single to the future and what it contains for himself and family.

There are thousands of men—the workers in our railroads and other industrial institutions, drawing good salaries—who are situated exactly as is Mr. Powls. They expect some day to quit their present jobs and get a home of their own on the earth and are looking for the best place. To all such this letter will be of particular interest.

Mendota, Illinois, June 30, 1909.

Mr. Richard A. Haste:

As I told you, I will give you a report of what I found in the Bluewater Valley. I made a thorough investigation and the following is from my notes made on the ground:

First: The climate is fine. It gets quite warm in the sun but is cool in the shade. At night it is very cool. A person needs covers to be comfortable. The coldest it gets here is about 10 above zero and the warmest about 94; the nights are from 50 to 55.

You ask, Does the climate undermine a man's ambition?

No, no, no!

The soil is a reddish sandy loam, in some places volcanic ash with here and there spots of adobe.

The products are what you will find in similar climates. Alfalfa will go about 1½ tons to the acre per cutting—can raise three crops, but sure of two. The hay brings $15.00 per ton, and that is a conservative estimate. Alfalfa seed costs from 15c to 18c per pound and it requires about 15 lbs. to the acre. Potatoes do well. There are no potato bugs here. Potatoes will yield 150 sacks per acre. The price ranges from 2 to 2½c per lb. They are easy to raise; so are turnips and carrots. Cabbage sells from 1 to 2c per lb. It is planted 2½ feet by 18 inches apart. It takes 7,000 plants for an acre. One man can plant an acre in three days. They are raising 15,000 lbs. of onions on an acre and get about 3c per lb. Celery retails at Albuquerque at 40c to 75c per bunch. I should judge celery to be the best crop here for profit. They are trying asparagus and it seems to be doing well. Tomatoes yield about 20,000 lbs. per acre. They sell for 5c per lb. Corn is not a favorite crop, but some kinds grow fairly well. They get $1.50 per hundred lbs. Wheat does well and yields from 40 to 50 bushels per acre. Oats will yield from 60 to 100 bushels. It can be cut green for hay and in that way two cuttings can be had and will run about 1½ tons to an acre at each cutting. They sow from 50 to 60 lbs. to an acre.

I have seen a great many men from different parts of the country and talked with them about fruits here. They all agree that this will be a fine valley for fruits. They know the valley and seem to know what they are talking about, as they come from the apple countries of Washington, Montana and Colorado. I am told that in the San Mateo Valley, 25 miles to the northeast of here, the finest kinds of fruits are raised.

Poultry is the best thing in the valley. Eggs sell as high as 60c per dozen at Albuquerque. At present, June 30th, 1909, they are selling for 35c per dozen. A pullet weighing 2 lbs. will sell for $1.00. They are easily raised, the climate seems to suit them. To make a long story short, it is the best place to raise poultry that I have seen in the United States, and I know somehing about chicken-raising.

The Mexican and Indian ponies that are good enough for light work can be had for from $40 to $60; unbroken for from $15 to $20.

Sheep, goats, hogs and cattle all do well. There is still an abundance of free range for the cattle.

The spring work opens about the 1st of April.

One important thing is the labor, which can be obtained for about $1.00 per lay. This is Indian labor, which is very faithful and abundant. You can get it when you want it by simply notifying one of the chiefs. This is important in a fruit country or where sugar beets are raised, and this will eventually be a good sugar beet country.

The settlers are honest, industrious Americans of good class.

At present only five months of school has been held, but the settlers are asking for nine months and no doubt they will get it.

The cost of living is about the same as in Illinois. Price of ham, 14c per lb., lard 15c. Range beef can be had in the fall for 6c per lb. It is delivered to your house, wrapped in cloth and can be hung up in the air, remaining fresh all winter.

Building material is cheap. There are lumber mills within 10 miles of Bluewater station and lime kilns 1½ miles away. Lime sells from 40c to 60c per bbl. An abundance of building rock can be had for the hauling.

As for fire wood, all that you have to do is to drive a few miles to the foothills and cut it.

Threshing machines, mowers and binders are owned by the irrigation company, and I am told by the settlers that they will cut and thresh at reasonable rates.

The land must be fenced against cattle. You can get cedar fence posts at 5c each. Rough lumber sells from $16 to $20 per M; matched flooring, $25 per M.

Water for domestic use can be had at a depth of about 130 feet by drilling. The water is very fine and reminds me of Rockford water. The most important thing about the Bluewater Irrigation proposition is the reservoir. The dam is a massive construction, the lake behind it is a beautiful sheet of water, into which the country drains for miles and miles up into the Zuni mountains.

In conclusion, will say that after looking the Bluewater Valley over thoroughly and talking with the settlers, I came to the conclusion that this is the best place I know for the man of small means and I have traveled over a large portion of the United States, but more especially, the northwest, west and south.

In talking with the settlers, I notice that they all spoke highly of the land company and its method of doing business.

The reason, as I have told you for investigating this valley so closely, is that I want a home for myself and family (wife and five children). (Mr. Powls is a locomotive engineer employed on one of the western lines running out of Chicago.)

I have a good job, but I am getting older every day and after a while the railroad company may not want me; then if I have a home in a place like the Bluewater Valley, I will be all right.

I bought 40 acres within three-quarters of a mile of the station. I expect to stay on the road for some time yet, but my intentions now are to move my family to New Mexico this fall or next spring. If any of your friends wish any further information, if they will come to see me, I will be glad to talk with them, or answer any letters which they may write.

Respectfully yours,

South Seventh Avenue. J. H. POWLS,

To afford readers of the Age more comprehensive information about the Gunnison Reclamation project, and the lands to be watered by this work, arrangements have been made to secure special reports of the opening of this tunnel in September. A staff representative will visit the section and will contribute a special article for the October issue of the journal.

Lewiston—Clarkston Valley

Four Acres Is the Average Farm—Intensive Culture Brings Heavy Orchard Crops—Water System Is Unique—Competent Experts Instruct in Orchard Culture—Dahlhjelm Company Pushing Land Sales in Eastern Markets.

Irrigation is the wonder of the west. What it has done is beyond the conception of those who have not studied it closely. Every place where water has been given to arid or semi-arid ground the agricultural possibilities have been multiplied by four.

The Lewiston-Clarkston Valley is an ancient lake bed, lying 2,500 feet below the general level of the country surrounding it. Before the time of irrigation the valley grew wheat, and wheat only, but the wheat it produced was double in quantity of that grown in the grain areas of the middle west. With irrigation the land became fruit land, and instead of the gold of the grain fields came the green of the vineyards and orchards.

The first section at Lewiston and Clarkston to be put in irrigation has now been producing fruit crops for many years. In this body of land are 2,000 acres, and in the houses and cottages built thereon there live 3,000 persons. The average holding of each family is less than 4 acres. Many there be, plutocrats among the rest, who have ten and a few that have fifteen and twenty acres. If the average be four and there be those who have more, then there must be many who have very much less than four.

Indeed, there are scores who crop but two acres. There is at least one family which gets its living from one acre. The visitor to this district having been told of the small units into which this land is divided is amazed at the class of homes which the residents have been able to build.

While, of course, there are a few shacks and unpainted cottages, many are the two story houses and low lying bungalows. If by chance the house is a poor house, it is evident in the appearance of the surrounding orchard that unthrift, and not unproductive soil, is the cause.

We all know that intensive cultivation will produce great profits from small acreages, but intensive cultivation has been in no great manner responsible for the conditions in the Lewiston-Clarkston country for the land is no more extensively cultivated than any other orchard district. The trees look like trees everywhere which are properly handled in a horticultural way. They would appear to be set no closer together nor to be larger than in any well handled commercial orchard in the West, yet the profits must be exceedingly great to allow a four acre tract, to say nothing of those of lesser size, to give a good living to the owner.

Peach and Apple Orchard, Lewiston Orchards, Photo, July 4, 1909.

About four years since, a company of capitalists in Portland, Oregon, conceived the idea of irrigating a large body of land immediately suburban to the city of Lewiston itself. They studied the conditions of the already producing orchards and vineyards most carefully, and decided that with land so rich and in a locality so favored by nature they could afford to do exceptional things in the development of a fruit enterprise. They studied the evils connected with orcharding and endeavored in their plans to remedy them. The regular methods of irrigation with open flumes and ditches they would not accept, but in order to provide water for domestic purposes, as well as for the thirsty soil, they laid down a city water system. Water under pressure in buried pipes marked a radical step forward in irrigation; something never attempted before, on a large scale, in the world.

A semi-technical description of the water system at Lewiston will certainly not be without interest in the Irrigation Age, particularly as the idea of serving agricultural lands with a pipe system of water is unique to this pro-

ject. In order that the water supply should be pure for domestic uses, the company sought a water shed on the streams that feed the Clearwater River.

The drainage area from which the water is taken is uncontaminated by habitation. The company has not as yet used all the water available in its drainage area, but for the purposes of present cultivation they take their water from the Sweetwater, a name exactly descriptive of the water served. Up in the mountains near the timber line they have placed the head gates from whence the water is brought in flumes and ditches down to the great reservoir. The course taken by the flumes and ditches was barred by engineering difficulties of the most obstinate kind. The canyon of the Sweetwater is deep and precipitous, its side walls rocky for the most part, dropping abruptly from summit to base. In some cases it was necessary to hang the flumes on the side walls and in others to blast the ditches from the solid rock itself.

At one point an inverted syphon was installed to carry the water across the canyon.

The present great reservoir has a capacity of 6,000 acre feet of water. It is a natural depression in the hills, and is more than four hundred feet above and ten miles distant from the land it serves. The front wall dam of the reservoir is of earth construction laid down in water and is approximately one mile long. It is one of the largest pieces of construction of its kind in the world. The water is drawn from the reservoir at its base in main line pipes and carried down to the orchard tracts. These have been laid off in streets and alleys, each five acre tract facing a

Irrigating with Pressure Water, Lewiston-Clarkston Project.

street and abutting upon an alley, and in the alleys the water pipes lay buried three feet underground. It required on the part of the company much inquiry and careful investigation before they finally decided the class of material to be used in their pipe construction. They found that wooden stave pipes which had been saturated had borne the brunt of time in some cases for more than a hundred years. Inasmuch as they propose to serve their properties with domestic water at all times, the pipes would be constantly filled with water. They therefore have used wooden stave pipes as the most permanent material that could be found.

In order to remove excessive pressure it was found necessary to construct a relief reservoir in the center of the district. They availed themselves of the opportunity and have laid out an artificial lake with a surrounding park system for the beautification of the district. The park will contain 25 acres of land and will be planted to shade trees and lawn. It is to be the home of the Lewiston Country Club.

Very early in their operations they discovered the buyers to whom they sold property were for the most part impractical, drawn, as they were, from social classes a generation at least removed from agriculture. It seemed necessary to provide the district with competent advice and to that end a horticultural department was organized and for its head E. H. Twight, Professor of Horticulture in the University of California, was engaged. Much of their land is being sold to buyers who do not wish to become residents until the orchards are in a state of bearing. Work on such properties is supervised by Prof. Twight, and the experience of three years has demonstrated that

Onion Crop between Apple Trees, Lewiston Orchards.

they have made a growth equal to those handled by residents.

This company has also developed a fruit sales system in order that the grower may secure as high a price for his crop as the markets of his country afford.

Sufficient has been said to give the reader an idea of the distinguishing characteristics of the Lewiston district and with the early introduction of these lands to the eastern public a great influx of settlers can be assured, just now the Lewiston Land and Water Co., the company mentioned above, has made an arrangement with the Dahlhjelm Co., which has been immensely successful in handling irrigated lands in the eastern markets and the eastern public will be asked to interest itself in the Lewiston District.

THE APPLE EXPOSITION.

In the present days of science it is entirely wrong for the producers of any of the soil products to allow anything to waste. On the contrary every effort should be put forth to take care of every portion of a crop to the end that the greatest amount of money may be realized from it.

There is no fruit produced that offers so many inducements to care for the by-product as does the apple. It is exceedingly strange that more growers have not taken advantage of the opportunities that are offered to glean a large reward for their labors. There are so many by-products that will bring a big price that an investigation should be made by every producer and to help this investigation along the managers of the coming Colorado National Apple Exposition will have a department wherein the factory-made by-products will be displayed and elegant prizes offered for the exhibits. There will also be exhibits of machinery used in producing these by-products and representatives of the firms selling this machinery will be on hand to explain all about the methods used in handling the apples through their machinery to produce the finished by-product so valuable to the growers, and which will help so much in building up their account of receipts for the season.

A TEN THOUSAND ACRE APPLE ORCHARD

Located twenty-two miles north from the city of Spokane, Washington, in a valley surrounded by mountains, lies the property of Arcadia Orchards Company. The land lies beautifully with a slight slope to the southeast.

The company is now developing in this valley one of the largest, if not the largest, commercial orchard in the entire west. Water for irrigation is supplied by gravity, and is taken from Deer and Loon Lakes, located about twelve miles north and covering 2,700 acres of land. The elevation of these lakes is about 300 feet above the land owned by the company, and by tapping the south end the process of diverting the water is very simple, as it can be conducted the greater part of the way through a creek bed which runs directly through the land of the Arcadia Orchards Company. The water is delivered upon the land in open ditches, thus avoiding the expense of a pumping plant.

The soil is a sandy loam, and good crops are raised even without irrigation. The company is developing its tracts into one vast orchard, and the land is being sold in five and ten acre tracts to homeseekers and investors.

The company has rather a novel proposition, as it plants the land to orchard, irrigates and cares for it for four years, and turns over to the purchaser a bearing orchard at the expiration of that time.

The company makes no charge for water, and pays taxes for five years from date of contract. Under this plan non-residents and persons engaged in other occupations are able to secure an irrigated orchard, and have it brought to bearing by the company.

It is estimated that by the fall of 1910, over 2,000 acres of this land will be planted to orchard and the entire tract under irrigation. The land is about 2,000 feet above sea level, and surrounding orchards indicate the splendid adaptability for orchard-raising.

Deer Park, a city of one thousand inhabitants, is located about the center of the company's property on the Spokane Falls & Northern Railroad.

The head office of the company is in the Hyde Block, Spokane, Wash.

THE LIME-SULPHUR WASH.

For controlling the San Jose scale there is no solution that can approach the Lime-Sulphur wash. In fact, it is the only sure remedy for this orchard destroyer. While it may not absolutely exterminate the San Jose scale, it is so effective that one thorough treatment late each winter is sufficient to keep the trees in good condition. And again, it has the advantage of being a very cheap solution.

Treatment can be made in the fall after the leaves are off, when trees are very badly infested, at first discovery of the scale. The Lime-Sulphur wash is mainly a winter remedy and the later it is applied, the better it is, just so the treatment is given before the buds open, as it at that time would be very injurious to the foliage. If delays necessitated its use after the buds are open, care should be taken to see that the wash is directed to the branches and trunk only, leaving the twigs and blossoms untouched.

When trees have been sprayed with the Lime-Sulphur wash in late winter, there is no need to spray with Bordeaux mixture until after the blossoms fall. In other words, a late application of Lime-Sulphur wash takes the place of the late winter application of Bordeaux mixture.

It is a very good practice to spray with Lime-Sulphur every two or three years, even if there be no scale present, as it has an excellent general effect on the tree in removing moss, dead bark, etc. This would also check the scale if it should get started and would entirely prevent it from killing hundred of trees before its discovery, as is so often the case.

The Lime-Sulphur wash, like everything else in the spray mixture class, has its disadvantages. It is disagreeable to prepare, destructive to spray pumps and very difficult to store, but its advantages are sufficient to warrant its use time and time again. No spray pump without brass working parts should be used in its application.

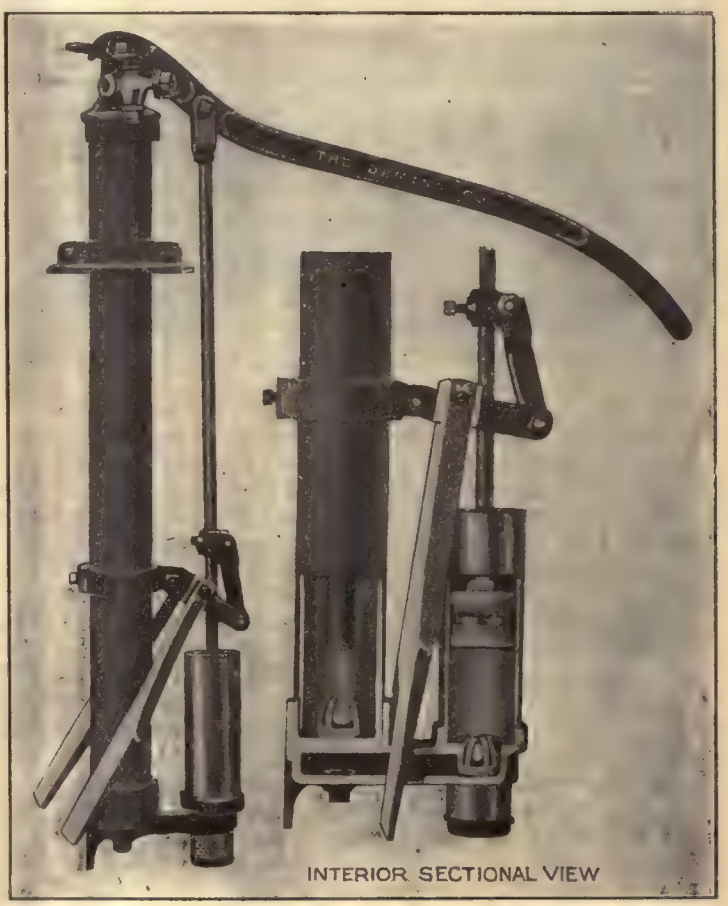
For preparing one barrel of the wash, the following formula is cosidered as a standard:

Stone lime	15 lbs.
Sulphur (flowers)	15 lbs.
Water to make	50 gallons.

Heat from four to six gallons of water to boiling over fire in large iron or brass kettle. Mix the sulphur with enough hot water to make a thin paste and pour it into the kettle with the hot water. Then add the lime and as it slakes, dash in a little cold water as needed, to keep it from boiling over or becoming dry. As the slaking ceases, keep it boiling from the fire for half an hour longer, then dilute with water (cold is all right) to make the 50 gallons; strain through a fine wire screen or cloth to remove all sediment, and spray.

The Lime-Sulphur wash not only kills the scales with which it actually comes in contact, but it forms a thin firm coating over the twigs upon which the young insects seem to find difficulty in settling down to feed and grow. As this coating gradually wears off by rains or by growth of the tree, it is important that the wash be applied as late in the winter as possible, so that the coating shall be present when the insects begin to breed in the spring.

The best time to treat the trees therefore, is in the late winter—as late as possible—so the work is completed before the buds have opened. Trees that are badly infested may be given two treatments; the first in late November or December, and the second as late as possible (usually in March) but once the scale is subdued, one application late each winter is sufficient.



A First-Class Pump for Applying Lime-Sulphur Wash. Made by the Deming Company, Salem, Ohio.

(Continued from page 402)

Eleventh.—What are your present transportation facilities and are they adequate and satisfactory?

Twelfth.—What is the reasonable present average value per acre of land in your project, exclusive of water right, the value being computed on the basis of productive capacity, interest being computed at 6 per cent. per annum, and what was the value thereof, exclusive of water right, prior to the construction of the reclamation works?

Thirteenth.—Are nonirrigable public lands valuable for pasture contiguous to or in the vicinity of your project, and if so, to what extent and under what conditions are the same now available for the stock owned by water users?

Fourteenth.—What suggestion have you to offer for legislation to make public pasture lands in the vicinity of your project available for the use of those cultivating the irrigated lands?

Fifteenth.—Is the farm unit of your project, as established by the Secretary of the Interior, satisfactory, and if not would the objection be removed by the addition of pasturage rights as suggested by the foregoing question?

In answering the foregoing it is desirable that you take into consideration the cost of wages incident to the cultivation of a larger tract and the increased expense connected with the initial cost and the cost of improvements.

Sixteenth.—What is your source of supply for fuel and building materials and the average cost thereof?

Seventeenth.—To what extent have you been aided in your farming operations by information acquired from the work of agriculture experiment stations, and demonstration farms established on the irrigation projects?

Eighteenth.—What are your school facilities and how are school funds provided?

Ninteenth.—How, in your opinion, can Congress best promote the general welfare of the water users and carry out the purposes of the Reclamation Act?

Reports from the various points visited by the committee indicate that much good resulted from the hearing

HEAVY LAND SALES IN PECOS VALLEY.

With a railroad rapidly nearing completion, a delightful climate, reports of bounteous crops, and an unlimited reservoir supply of water for irrigation purposes, many homemakers are being attracted to the Pecos Palisades, the section now exploited by the United States & Mexican company of Kansas City.

Until within the last few weeks, the many advantages of this district were unknown to other than the builders of the irrigation system. Distant from either railroads or frequently traveled trails, the superior qualities of the soil and the use with which a permanent supply of water may be stored, escaped the eye of exploring capitalists.

Discovery of the Pecos Palisades was in the nature of a "find." Because of the immensity of the proposition, and the decision of its finders to expect greater returns from railroad traffic than from the sale of lands, the tracts are now being placed on the market at a price of $60 per acre.

Little exploitation has been required from the United States & Mexican Trust company after the first hundred tracts were sold. Settlers, convinced by proof of harvests and the near approach of the railroad work, that land values must rise rapidly in the near future, have induced their eastern friends and relatives to make purchases and it is reported by the company in charge, that sales have reached enormous figures within the last four weeks.

As a part of its exploitation program, the company prepared a souvenir booklet, indicating the many values of the land and the liability to rapid advances in the price per acre as soon as the new railroad had been opened for traffic. In many respects, this booklet is unique and its chief suggestion is that buyers "get there ahead of the railroad." Letters from buyers of prominence in various parts of the country are exhibited as proof that the conservative homeseeker has been interested. Photographs give an excellent portrayal of the beauty of the scenery and the bountiful harvests. The latter is proven conclusively by authorative reports of yields and harvests.

Finding that the demand for land in the Pecos Palisades exceeded all expectations and promised complete sale within a few months without dependence upon the costly and troublesome publicity campaign, the company now refuses to distribute its costly souvenir unless it is apparent that the applicant is a bona fide land seeker and is not requesting the book merely out of curiosity.

Aside from detailed information as to location of land, climate, soil, railroad construction work and many other facts in which the land seeker is interested, the company sub-

You Must Level Irrigated Land

And slightly slope it from water supply if your farm is to earn good profits. The simple, quick, cheap way is to purchase a

20th Century Grader

and get the most money out of your land. The cuts (from pages 21 and 23 of our catalog) show machine leveling land and cutting ditches. Has **reversible blade** with which to throw up borders. Has **combination blade** for cutting laterals and open ditches. Has **sage-brush cutter** for grubbing out this troublesome growth. Thus this grader is adaptable not only to road grading but to many other purposes. You ought to buy one. Send now for free catalog and Special Irrigation Folder entitled **"Dollars in the Ditch."**

Baker Mfg. Co.
726 Fisher Building
CHICAGO, ILL.

Sage Brush Cutter on 20th Century.
Knives two inches below surface.

Leveling Seed Beds near Albuquerque, N. M. (Mr. Bluher)

This ditch is 24 in. deep and 30 in. wide. It carries 88 to 245 miner's inches of water, according to slope.

mits a proposition whereby the buyer may purchase ten, twenty and forty acre tracts by small cash payments each year.

The book is published by the Land Department of the United States & Mexican Trust company, of 950 Baltimore ave., Kansas City, Mo. This company is the fiscal agent of the Kansas City, Mexico & Orient Ry., known as the "Orient" way. A personal letter from the land commissioner, Mr. Hornbeck, to the editor, states that a copy of the book will be sent free to any person who may be in the market for irrigated land. The book is too expensive, he says, for promiscuous distribution among the merely curious.

It is announced that the Aberdeen Potato Growers' Association, including in its membership about 150 farmers near American Falls, Idaho, is planning to ship a carload of the finest spuds grown in that territory, to an eastern market with the object of advertising its project and the creation of an eastern market. Until the present time potatoes grown in this section have been sold under the Greely, Colorado, brand, but inasmuch as the Aberdeen product is of a superior grade, it is now proposed to establish a special brand.

NEW INCORPORATIONS.

CALIFORNIA.—Sacramento Valley West Side Canal Company; capital, $250,000; Glen and Colusa counties. Incorporators: Fentress Hill, San Francisco; D. W. Ross, Piedmont; J. L. Slater, Berkeley.

COLORADO.—Colorado & Texas Land & Irrigation Company. Directors are F. R. Park, Charles Cheney, H. B. Holmes, H. Bitner, H. P. Gamble, M. S. Ketchem, P. A. Hankins, George M. Teal, H. Evans and L. O. Hawkins, all of Boulder. Capital, $100,000, and the principal place of business McAllen, Hidalgo county, Texas.

Twin Reservoir Irrigation Company; T. M. Morrow, J. A. Bentley and E. J. Burns; $250,000; Grand Junction.

West Paradox Mutual Irrigation Company; Caldwell Yeaman, Frank E. Gove, S. I. Heyn; $50,000; Paradox, Colo.

The Stark-Hagadorn Irrigation Company, Denver; $600,000 capital; Edwin R. Stark, Aaron G. Hagadorn, James D. Hagadorn, J. E. Boas and R. H. Stark.

Denver Irrigated Farm Company; Cornelius J. Ton, Gustave Nelson, James A. Donnelly; $10,000.

Riverview Land and Irrigation Company; Z. X. Snyder, S. Milo Hadden, Victor E. Sayres; $100,000; Greeley.

IDAHO.—Sunnyside Irrigation Company, Weiser; capital, $25,000; incorporators, G. M. Waterhouse, August Backman and A. A. Record.

Big Lost River Irrigation Company; capital, $1,000,000; incorporators, J. E. Clinton, Jr., A. L. Tucker, C. B. Hurtt, Boise; A. McPherson, Twin Falls; N. M. Ruick, Boise, one share.

NEW MEXICO.—La Plata Land & Irrigation Company, Aztec, San Juan county, Durango, Colo., and Cheyenne, Wyo.; capital, $250,000; incorporators and directors are George W. Piper, Thomas C. Graden, William C. Henry, William C. Ferguson and Joe Prewitt.

Rio Mimbres Irrigation Company, Deming, Luna county. Capital, $300,000.

OREGON.—Umatilla Irrigation Lands Company; Hermiston; capital, $20,000; incorporators, J. S. Green, P. C. Holland and G. F. Kaufman.

TEXAS.—A permit to do business in Texas was granted the Texas Shallow Well Irrigation Company of Council Bluffs, Iowa. Principal Texas office, Louise, Wharton county; capital stock, $50,000.

The Old River Rice Irrigation Company of Wallisville, Chambers county, filed an amendment to its charter changing its principal office to Mount Belvieu, same county.

BOSTROM'S $15.00 FARM LEVEL HAS TELESCOPE

With Magnifying Lenses, Enabling You to Read the Target Over 400 Yards Away,

Shipping Weight 15 lbs.

Complete Outfit, with full instructions, Shipped Anywhere C. O. D. $15.00 and express charges subject to examination.

And is being welcomed by land owners from the Atlantic to the Pacific, for *Draining, Irrigating, Terracing, Ditching, Grading, Road Building, Running Fences, Setting Out Orchards, Levelling Buildings and Foundations, Getting Angles,* and every sort of work requiring a Level. With this outfit, which includes Level with TELESCOPE and Plumb-Bob in neat wood box, also Tripod, Graduated Rod and Target, no man needs a Surveyor or Civil Engineer. *Simplicity, Accuracy, Durability, GUARANTEED.* **ORDER TODAY,** direct from this offer—or, if more complete information is desired, *write today.* Address,

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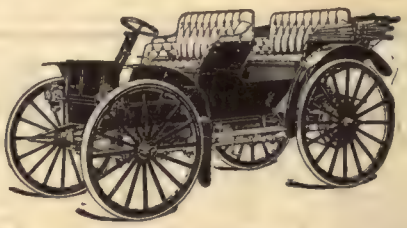

You are not interested in the highly luxurious cars costing many thousands of dollars that are built for paved streets and fine roads.

You want the car that will go anywhere at any time.

The International Auto Buggy

is designed to meet country conditions. It is built to travel alike over good roads, average roads and poor roads. You go up and down steep hills without danger of being stuck in deep roads and with a guarantee of getting safely to your journey's end.

It is a car that any member of the family old enough to drive a horse can quickly learn to operate. No car, no matter how high-priced, has a more perfect control

It is the car that has come to take the place of the carriage and runabout on the farm.

You must appreciate its advantages: Always ready. No bother about hitching up. No need to keep an extra driving team. No need to take a horse from farm work to make an urgent trip to town. No worry to horses when the roads are bad or the trip a long one.

You go quickly and in comfort in the Auto Buggy. Speed as you like, two to twenty miles an hour. The seven gallons of gasoline which the tank holds will last through a trip of 75 miles.

See the International local agent. He will demonstrate this car and supply you with catalogues giving all particulars; or, if you prefer, write nearest branch house.

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INTERNATIONAL HARVESTER COMPANY OF AMERICA, CHICAGO, U.S.A.
(Incorporated)

SWINDLERS AT WORK.

The proposed opening of lands on the Yuma Indian Reservation in southeastern California under the Yuma irrigation project, which is expected to take place soon, has aroused the activities of a band of swindlers who seem to be operating principally in the southwest. These sharpers have selected as their victims prospective homeseekers who are attracted by the opportunities for securing desirable tracts of the fast diminishing public lands.

By means of advertisements cleverly worded, they claim to be able to locate settlers—for a consideration—on choice tracts of the reservation, and to furnish application blanks and information concerning the details of the opening.

Judging from complaints being received at the office of the Reclamation Service in Washington, these swindlers are reaping a rich harvest.

The time and method of opening these lands have not yet been decided upon by the Secretary of the Interior. When the matter has been settled by the department, due notice will be given through the public press, and all necessary blanks can be obtained at that time without charge until and after such announcement all requests for information should be made to the office of the Reclamation Service, Washington, D. C., or to the Project Engineer at Yuma, Arizona.

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Wooden Plows

THEN WHY USE WOODEN HEADGATES

Farm implements are made principally of iron and steel. Why not the headgates in your irrigating reservoirs and ditches?

If a headgate leaks, you lose water. Water lost means crops and money lost. A water-tight gate cannot be made of wood, because wood swells and warps. Northwestern Iron Headgates do not leak because all bearings are machined to water-tight joints.

Wooden gates stick and are hard to regulate. You lose time. During the irrigating season time is as valuable as water. Northwestern Iron Headgates do not stick, and they operate easily and quickly even after years of service.

Wood decays, and repairs on wooden gates are a constant trouble and expense. Northwestern Iron Headgates cost more, but being much more durable, they are worth more. The repairs on a wooden gate amount to more than the difference in the cost.

Instead of repairing wooden gates, it will pay you to replace them with water-tight, handy, and durable iron headgates. Making a specialty of iron headgates, I can save you money on them, and furnish gates especially adapted to your needs. My new catalogue shows headgates for almost any purpose, any pressure, any size and any price.

C. D. BUTCHART

501 Mercantile Bldg. Denver, Col.

IRRIGATED LAND

Open to Settlement

Some of the richest and most productive farm land in the world lies along the Shoshone and the Big Horn Rivers in the "Big Horn Basin" of Wyoming. Over ten million dollars is being spent by the United States Government and by private enterprise in building great concrete dams and ditches in order to lead an inexhaustible supply of water to irrigate some of the best of these lands and make them independent of rainfall. A great portion of this work is completed, and these lands, with a perpetual supply of water for irrigating them, are now offered you on reasonable terms.

This is an Unusual Opportunity

to get a wonderfully productive farm, with water whenever you want it, regardless of rainfall; in a country where a single crop can be made to pay for the land; where 50 bushels of wheat or barley, and 75 bushels of oats are commonly grown to the acre; where fruits grow luxuriously and where the glorious air and sunshine, summer and winter, make life a joyous thing.

This wonderful country is developing fast. Churches and schools abound. The population is intelligent, Godfearing and law-abiding, and any man out there who is half a man has the opportunity to make himself independent.

Land in this great country is going fast. If you have any thought for the welfare of yourself or children, find out all about this opportunity to-day.

Send for our new folder with large map, and **also folders issued** by the private irrigation companies and by the United States Government Reclamation Service **giving all information about these lands, terms, etc. Free for the asking.** Study these folders and then **come with me** on my next excursion to the Big Horn Basin and **see for yourself.** My excursions, which I personally conduct, leave Omaha on the 1st and 3d Tuesday each month, on which days reduced railroad rates are in effect. My services are free to you.

Burlington Route

D. CLEM DEAVER, General Agent

Landseekers' Information Bureau,

59 Q Building, OMAHA, NEB.

N. B.—The winter weather in the Basin Country is fine and lands can usually be seen to advantage all Winter,

$1,000 Reward

for its equal. Wind power doubled. Two 14 ft. wheels work on same pinion; second wheel gives more power than first.

A Governor That Governs

in all winds. Develops 10 full h. p. in 20 mile wind. All power needed for farm, shop, irrigating, etc. Ask about our self oiling, self governed, single wheel pumper—also Armsaver Husker. Ask for book 60

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For Pumping, Cream Separators, Churns, Wash Machines, etc. **FREE TRIAL** Ask for catalog—all sizes

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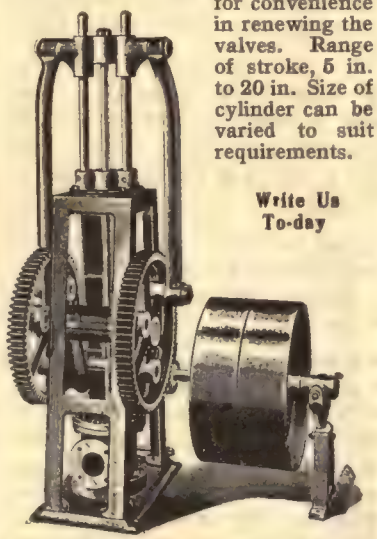
Power Working Heads For Deep Wells

Designed especially for pumping large quantities of water from deep wells. The frame is hinged to the base and can be thrown back out of the way for convenience in renewing the valves. Range of stroke, 5 in. to 20 in. Size of cylinder can be varied to suit requirements.



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The Irrigation Age
one year and
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until you get my "Leader Fence Book" and learn how to secure the cheapest and best all-wire field and yard fence made. Pay no royalty to trusts or factory combinations. I challenge any and all fence makers to equal the "Leader Fence" in strength, durability and price.

I make the **Leader Fence** in the **most economically run fence factory** in this country, of the very best galvanized steel wire, and sell it **direct to you** at world-beating prices. Or, I will sell you the wire and all materials at wholesale prices and furnish you the **Perfection Fence Machine**, with which you can build the fence right on the posts at home. **I am the All-Round Leader Fence Man.** Write today for my FREE fence book.

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LEADER FENCE CO., Dept. 35, ST. CHARLES, ILL.

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ABSOLUTELY THE BEST

Cutters Planters, Sprayers, Diggers, Sorters.

Write for free Booklet, "Potato Culture"

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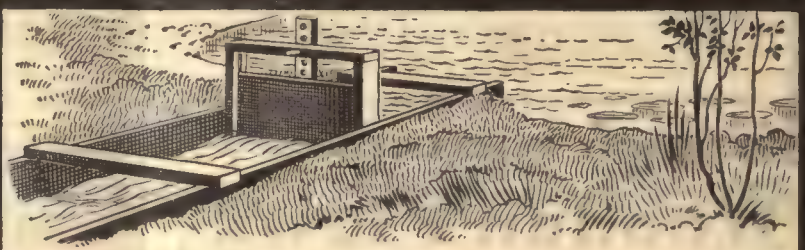

IRRIGATE FROM YOUR OWN RESERVOIR

A reservoir on your own land makes you independent on the water question.

You will have no trouble in filling the reservoir during the spring rains, when all the streams, little and big are flooded.

Then you will not be at the mercy of ditch owners and other water users when the dry season comes.

The few acres you will require for the reservoir will not be wasted. They will serve to make all your other lands vastly more valuable.

Raise the Water With An I. H. C. Gasoline Engine

Of course you cannot have your reservoir on your high ground. Locate it on the bottom land where it is easiest made and certain to be filled with drainage waters.

Then pump the water wherever you need it with an I. H. C. gasoline engine.

These engines, always powerful and reliable, have been found to be excellently adapted to irrigation pumping.

They are operated with little expense. They require but little attention.

They enable you to utilize the waste waters such as deep streams, sloughs and ponds upon your own land.

The farmer who has a water supply of his own, so that he may irrigate a few hours now and again, without regard to whether the water is flowing in the company ditch, is the independent farmer.

A reservoir on your own land and an I. H. C. gasoline engine to give you the water when you want it, where you want it, is the solution of the problem.

The I. H. C. gasoline engine can be used for other purposes beside pumping. It is a general purpose engine, which will be found an all around handy farm helper—to run grinder, sheller, separator, fanning mill, washing machine, churn, grindstone, etc. The I.H.C. line includes besides Famous pumping engines and jacks, the following:

Stationary engines, from 1 to 25 horse-power; Portable engines, from 2 to 20 horse-power; Skidded engines, from 2 to 8-horse-power; Tractors, 12, 15 and 20-horse-power, and Sawing and Spraying outfits.

Call on the International local agent for catalogs and all particulars in regard to these engines, or write nearest branch house.

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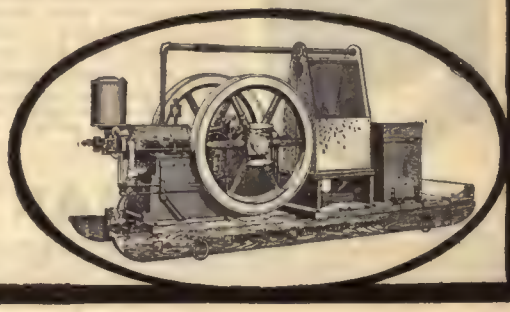

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Give full particulars.

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WANTED –To correspond with some young married man who has a thorough understanding of truck farming who would like to go to the state of Oregon or Washington with a gentleman of means to develop an irrigated farm. A good salary will be paid to the man who is a hustler, and who can give highest reference as to character and ability. Address, G R W., Room 621 Tremont Bldg., Boston, Mass.

GOOD IRRIGATION POWER

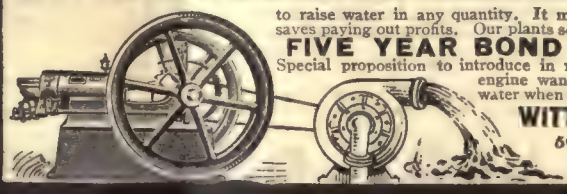
Is the first step in preparing for bountiful crops. Don't depend on weather, wind or streams but use a

WITTE GASOLINE OR KEROSENE ENGINE

to raise water in any quantity. It makes you independent and saves paying out profits. Our plants sold under

FIVE YEAR BOND GUARANTEE

Special proposition to introduce in new localities. State size engine wanted or quantity and lift of water when writing.



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A Humphryes' Hydraulic Ram will furnish you, when installed, with a permanent and automatic water supply Why spend money on costly pumping plants and time, strength and expense in operating same, when a Hydraulic Ram will lift your water and deliver it with absolutely no expense. The Humphryes' Pneumatic System will supply your residence with water under pressure for all domestic purposes and give service heretofore obtainable only with an elevated tank or direct connection with municipal water works. Our New Catalog "Domestic Water Supplies" tells you all about the HYDRAULIC RAM and PNEUMATIC SYSTEM and will be mailed you upon request.

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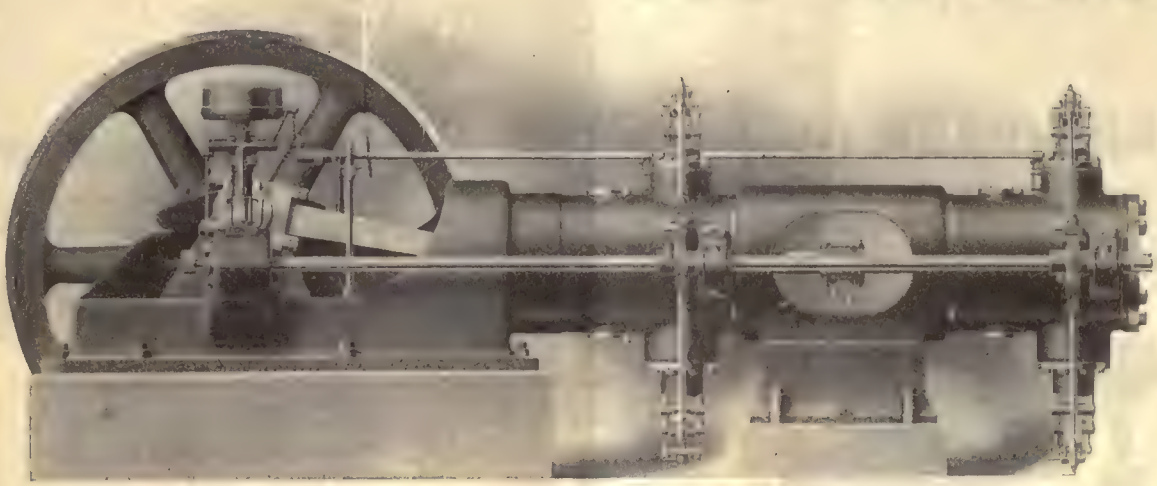

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Do Your Farming with a **HART-PARR GAS TRACTOR**

AND

SAVE MEN—SAVE HORSES—SAVE MONEY—SAVE WORRY

The latest development in labor machinery is the **HART-PARR GAS TRACTOR,** which is revolutionizing farming methods. They displace many men and more horses, and are always ready for service and eat nothing when standing idle. Think what it means to have cheap power and plenty of it, always at your command. You can use these Tractors for plowing, discing, seeding, harvesting, threshing, hauling, hay baling, feed grinding, running irrigating pumps—in fact, all kinds of heavy farm work.

Hundreds in Successful Operation—Built in sizes of 30, 45 and 80 H. P.

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USE GASOLINE, KEROSENE, DISTILLATE, or ALCOHOL

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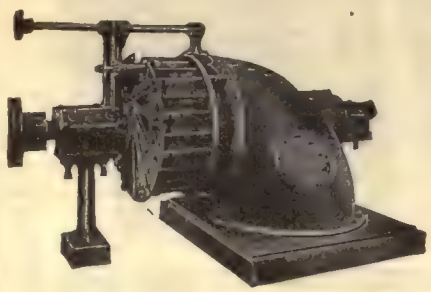

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When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the HIGH SPEED of the SAMSON, for a given power, lighter and consequently CHEAPER transmission machinery can be used.

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The illustration presented herewith shows a double line, No.168 Maginnis Galvanized Steel Irrigation Flume, furnished the well known firm of Trowbridge & Niver Company, Chicago, Illinois, for use on a canal at Emmett, Idaho. This flume carries about 300 cubic feet per second, and is erected around a bluff, alongside of the Payette River. The water flowing through the flume irrigates about 30,000 acres of very high grade fruit land in the Upper Payette Valley, around Emmett, Idaho.

These flumes are manufactured of galvanized steel and are generally recognized as the most durable and serviceable method of conveying water over depressions, streams and around side hills where ditches would require extraordinary care and high cost in construction. The Maginnis flumes are used very largely by all of the large irrigation projects as well as many of the smaller ones, and have given universal satisfaction.

Double Line Maginnis Flume Emmett, Idaho (Trowbridge & Niver Company Project).

We present herewith a letter from Mr. Fred A. Wilkie, engineer in charge of the Emmett project, which speaks very highly of the efficiency and working qualities of this particular job:

Maginnis Flume Mnfg. Co., Kimball, Nebraska. Emmett, Idaho, July 19, 1909.

Gentlemen—Yours of the 16th received. I will forward photographs in about three days. All flumes are working splendidly and giving good satisfaction. Trusting this will find you well, I remain,

Very respectfully yours,
FRED A. WILKIE

For Full Particulars, Estimates, etc., Address

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HERE IS A DEEP WELL INSTALLATION

FOR IRRIGATION

AMES DEEP WELL PUMP

TWENTY HORSE POWER ENGINE **12-INCH WELL 200 FEET DEEP** **PUMP 150 FEET LONG**

DELIVERS AT SURFACE 400 GALLONS PER MINUTE

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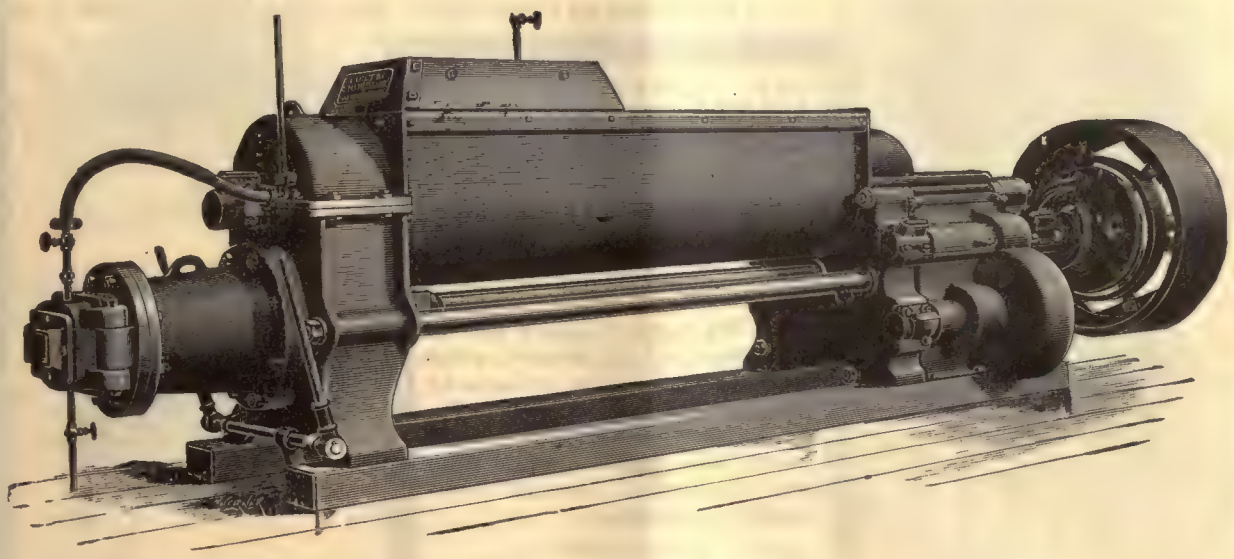
WITH PUG MILLS COMBINED



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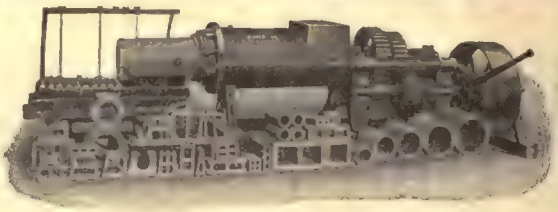
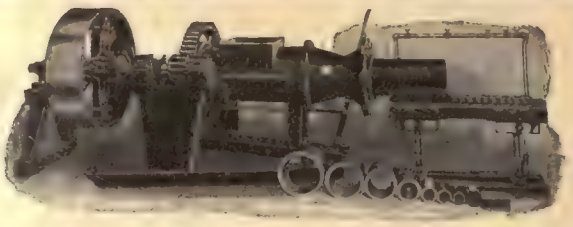
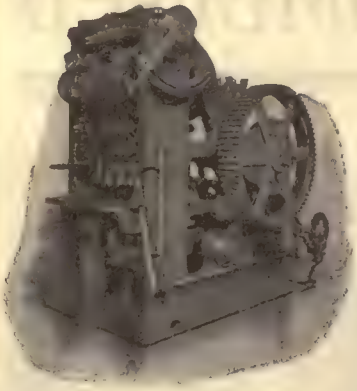


Centennial Auger Machine



Mascot Auger Machine



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We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

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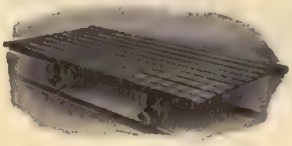

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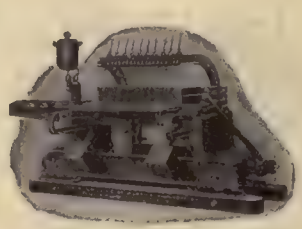

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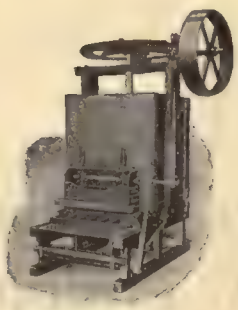

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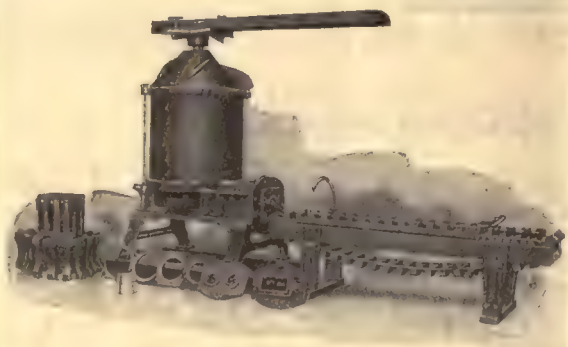

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Products of our Auger Machines

KENNEWICK,
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The GATEWAY to the

Yakima Valley

ON THE LINE OF THE

Northern Pacific Railway

KENNEWICK
is a Settlement of Money Makers

TEN ACRES of Irrigated Land is All You Need, as Mr. Ingwall Smith's Letter Proves.

PLENTY OF SUNSHINE
PRODUCTIVE SOIL
PERMANENT WATER SUPPLY

Think it over quick. Are YOU doing as well as Mr. Smith and others are doing on so small an investment, with an absolute certainty of a permanent income?

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For information regarding Fares, Train Service, etc., write to

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The Scenic Highway through the Land of Fortune

Kennewick, Wash.,
Feb. 17, '09.

Mr. C. W. Mott,
G. E. A., N. P. Ry.,
St. Paul, Minn.

Dear Sir:

I have done fine. I came from Iowa here. In July, 1894, I bought 10 acres, 2 miles from Kennewick. Have 5 acres in alfalfa, 5 acres in fruit. After the second year my income has averaged $1200 a year from the 10 acres, also the cost of my living. Have a family of five. We have a good climate, good neighbors, schools and churches.

Yours truly,
INGWALL SMITH.

Smith's Ranch on Columbia River, Kennewick

Home of Mr. Smith, 10 acres, average income $1200 per year

Apricot Tree. $20 worth of Fruit in 1908

FRUIT FROM MR. SMITH'S RANCH.

100,000 Acres of Rich Land in the Eden Valley

SOUTHERN WYOMING, ALREADY UNDER WATER ARE BEING RECLAIMED AND FOR SALE UNDER THE CAREY ACT

This gift of the Federal Government in the State of WYOMING, is the greatest opportunity ever offered those seeking **PERMANENT HOMES.**

Any person who is fortunate enough to obtain a claim in the EDEN VALLEY will soon find himself possessing an income-producing investment far surpassing his most sanguine expectations.

Filing on a claim in EDEN VALLEY may be done without leaving your **HOME TOWN.**

Of the many large Irrigation Projects the EDEN VALLEY is the one in which water has been delivered at a fixed date.

The dams, lower storage reservoirs, main canals, laterals, etc., are practically completed and land is already under water.

SETTLERS ARE COMING IN RAPIDLY AND BUILDING SUBSTANTIAL HOMES.

A large area is already under cultivation and many of the settlers have produced abundant crops this season.

Virgin soil seeded in Alfalfa the latter part of May has produced two full cuttings and a feed growth, which indicates that the soil in the EDEN VALLEY will produce three full cuttings of Alfalfa a season.

HEADWATERS OF BIG SANDY RIVER

Wheat of best quality yields abundantly.

Oats produce for first yield on raw soil 40 to 80 bushels per acre.

Our settlers claim that, while the seeding was done late in the season on raw soil, and with rather late water application, the yield of the EDEN VALLEY is greater than that of Nebraska or Kansas lands.

The railroad question is practically solved. The Union Pacific is about to construct a branch line from Rock Springs north to the new coal mines about twenty-one miles distant in the direction of Eden Valley.

Don't miss this opportunity to get an irrigated farm with perpetual water rights under the CAREY ACT. The farms in the EDEN VALLEY are the cheapest CAREY ACT lands on the market today.

Look for our exhibition of crops produced in Eden Valley both before and after irrigation, with Photos, at the U. S. Land and Irrigation Exposition to be held at the Coliseum, Chicago, November 20th to December 4th, 1909.

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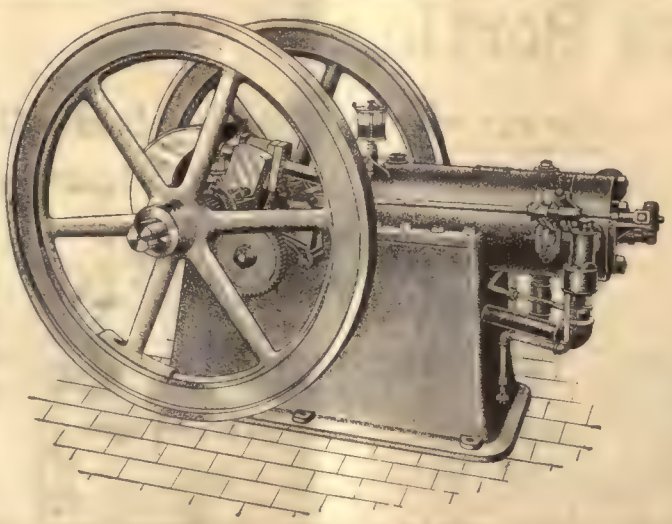

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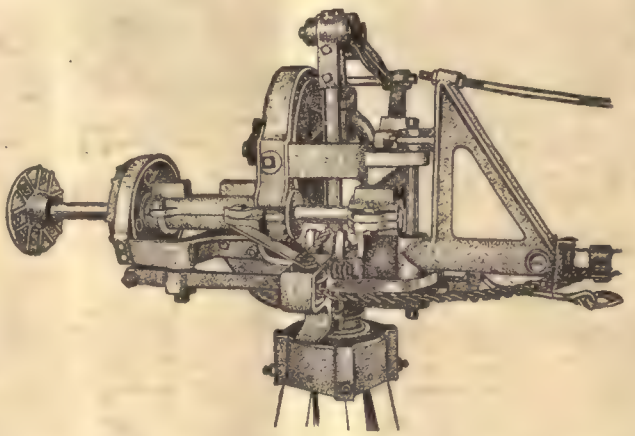

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VOL. XXIV | TITLE REGISTERED U.S.PATENT OFFICE | Nº 12

CHICAGO, OCTOBER, 1909

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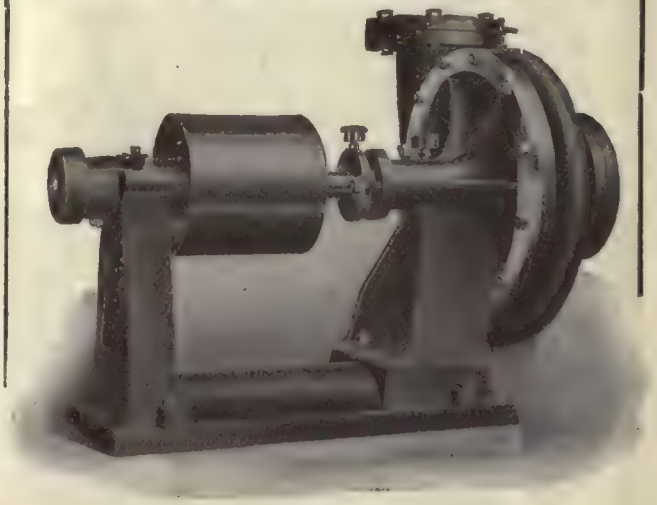

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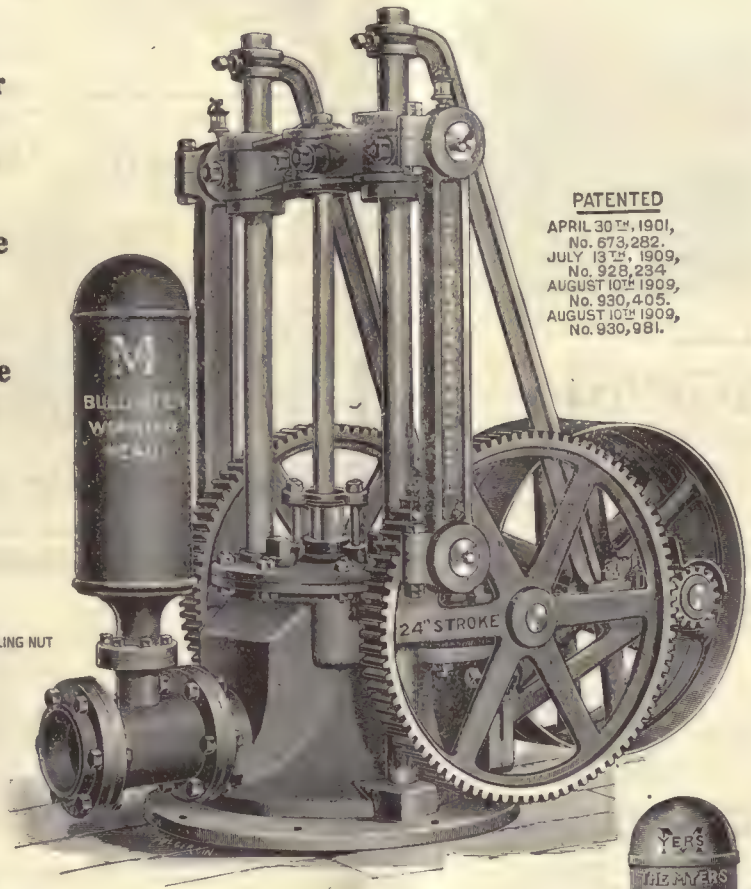

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Fig. 813

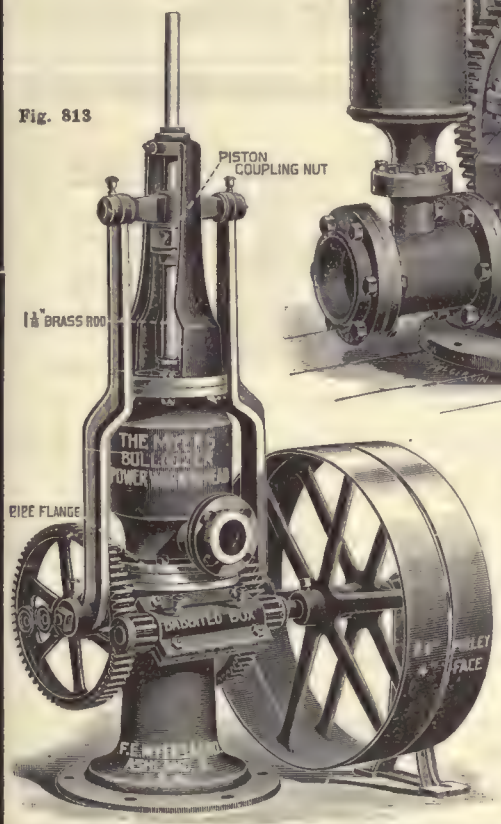

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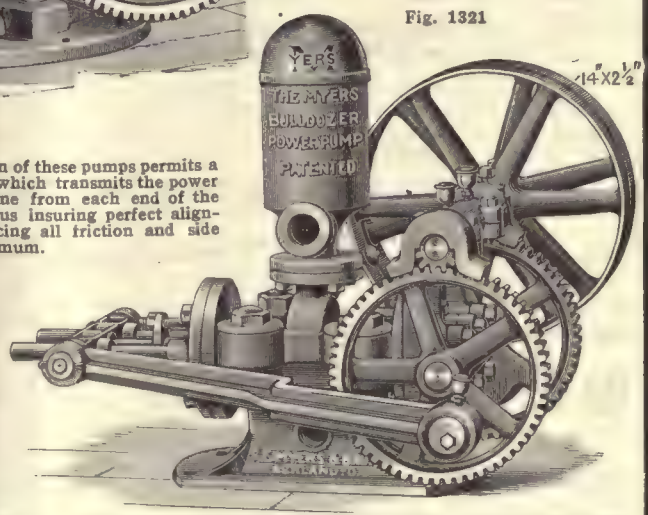
Fig. 1321



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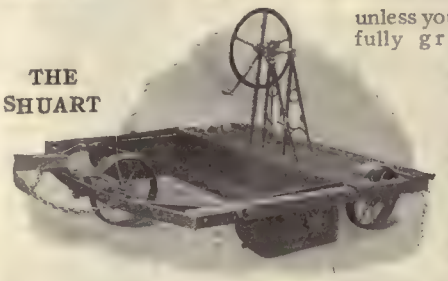

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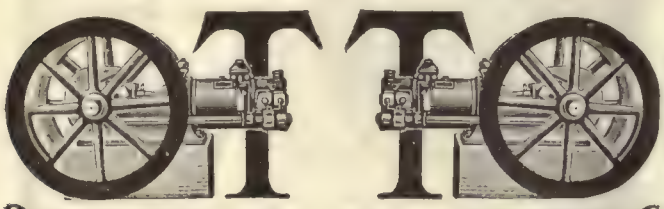

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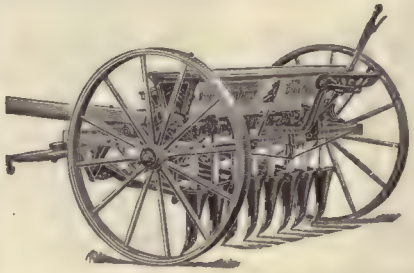

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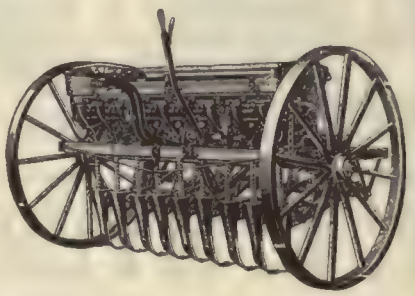

THE IRRIGATION AGE

VOL. XXIV CHICAGO, OCTOBER, 1909. NO. 12

THE IRRIGATION AGE
With which is Merged
MODERN IRRIGATION — THE DRAINAGE JOURNAL
THE IRRIGATION ERA — MID-WEST
ARID AMERICA — THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,
112 Dearborn Street, - - CHICAGO

Entered as second-class matter October 8, 1897, at the Postoffice at Chicago, Ill., under Act of March 3, 1879.

D. H. ANDERSON, Editor

ANNOUNCEMENT.

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Taft's Report Upholds Secretary.

With the cool, unbiased decision of a judge upon the bench, yet with all the force of his office as chief executive of the nation, President Taft has exonerated his Secretary of the Interior from censure in connection with the restoration and withdrawal of lands from settlement during April and May of this year.

The text of his letter, presented elsewhere in this journal, clears the atmosphere surrounding this controversy and by statement of fact disproves the assertion, as advanced before the irrigation congress, that the department of the interior had favored the alleged water power trust.

Coming from the mouth of the President, before whom records and evidence had been submitted, the statement of facts is unequivocal and positive. Even his enemies must give him commendation for his thorough and prompt investigation and decision.

The following excerpt from his letter is of especial interest to delegates and others who are conversant with the proceedings of the Seventeenth National Irrigation Congress:

"The inference which was sought to have drawn and which was drawn by newspapers hostile to you, was that you had brought about the restoration to settlement of the land upon which were the water power sites for the purpose of enabling private water power companies to acquire vested interests; and after doing so you had then withdrawn what remained of the public settlement, and that you took this course because you were out of sympathy with that policy of conservation of national resources and were in favor of the corporate control of such water power sites. When the facts are examined in this regard it will be found that the persons responsible for the circulation of these charges have done you a cruel injustice."

Those delegates to the irrigation congress who were involved in or responsible for this controversy should pause to consider the effect of their work. In courteous language the President has declared that falsehoods were uttered upon the floor of that congress. Indirectly he has charged that certain accredited delegates were enabled to so hoodwink their fellows that the congress became a judicial tribunal and passed decision on the policies of the present chief executive.

Following the session of this congress in August THE IRRIGATION AGE asserted that as a convention of irrigators the National Irrigation Congress had outlived its usefulness. In view of the outcome of the water power trust investigation, a matter that ought not to have found place in the irrigation congress, this view is fully vindicated.

Pueblo has doubtless absorbed a valued lesson from Spokane's experience. Government officials who seize upon the irrigation congress for the play of petty and

despicable political intrigue, benefiting neither themselves nor the assemblage, should be rigidly excluded from participation. The break in the ranks is already wide—preparations for the Pueblo congress will be watched with interest and if a certain discredited government employe is allowed a place on next year's program it may be predicted that the congress as a gathering for the exchange of ideas relating to irrigation must be permanently destroyed.

Water Power Trust Bogey.

Seizing upon the alarming news from Spokane that Forester Pinchot has declared a "water power trust" to be in process of formation, numerous newspapers and periodicals hitherto conservative and sagacious, yielded to the excitement of the moment and hurried their editorial pens into tragic attacks upon this new found peril.

Even while President Taft was dictating the letter in complete vindication of his Secretary of the Interior from the charge against him in connection with the alleged operations of the water power trust, Collier's Weekly as well as a score of other publications were using frenzied terms in attack of Secretary Ballinger and in proclaiming Forester Pinchot as the savior of the nation's resources.

It is comical to watch the editorial cannon belch forth its flame and shot and to know that great tracts of atmosphere have been torn to shreds. But it is equally enjoyable to note that the big noise is harmless.

And now that these warlike editors know that their guns have exploded without cause, may they be expected to retract, to censure Pinchot the Magnifier, or commend Secretary Ballinger? The Forestor's publicity bureau must exert itself to soften the effect of the returning boomerang.

Charge Refuted: Pinchot Disgraced.

Toward Forester Pinchot this paper must continue its attitude of hostility. To be sure, his conservative utterances and his somewhat circumspect mention of the water power trust, of which he is the sole creator and sponsor, leave no avenue for condemnation. Yet every delegate to the irrigation congree is fully aware that it was Gifford Pinchot and no other who incited less intelligent members of the body to open an despicable attack upon his superior, Secretary Ballinger.

By law the commonwealth often inflicts greater punishment upon the inciter of a crime than upon the actual perpetrator. Were that law applied to the attack upon the Secretary of the Interior, Gifford Pinchot would today be the object of the President's excoriation, and ex-Governor Pardee would not be the "goat."

But for the seriousness of the offense, Mr. Pinchot might be commended for the smoothness with which his intrigue was executed. A well organized press bureau, similar to that conducted by the Forester for the exploitation primarily of his personal achievement and, secondarily, for the spread of the doctrine of forestry conservation, might easily produce a grossly exaggerated press dispatch from Bozeman, Mont. If this dispatch flashed over the wires at a moment when the Forester was uttering veiled charges against his superior, the incident might still awaken no suspicion.

But if there is added to this mixture a known enmity on the part of the Forester against his chief, and a desire to inflate a third term boom for a former patron, then the coincidents become matters of calculation and the motive for the full intrigue stands clearly revealed.

Forester Pinchot is guilty of a puerile attempt to promote a third term boom for his former chief. For the motive he may not be criticised; but for the method he merits naught but condemnation. The exposure has come and instead of casting discredit upon his superior and upon the present administration he has promoted public confidence and respect in both. Yet he appears to be still basking in the confidence of the President. And Pardee suffers.

Counsels Heavy Bond Issue.

With every engineer in charge of a government reclamation project clamoring for additional funds with which to bring his work to speedy conclusion, and with only half enough money with which to satisfy these requests, the position of Secretary Ballinger as chief of the reclamation bureau is not to be envied.

Whether the service attempted to prosecute work faster than moneys became available, or whether estimates of cost must be largely increased over the original figures, it is certain that one dollar cannot be made to do the work of two and the secretary is in a quandary.

Senator Borah, of Idaho, is authority for the statement that the secretary is looking with growing favor upon the plan to ask Congress for the issuance of bonds to the sum of $10,000,000, to be expended in hurrying engineering work. The stringency in funds has resulted to a large extent from the recent ruling to allow the issuance of no more scrip for labor performed by settlers, and it is foreseen that the bond issue will solve the trouble.

Owners of land in these government projects are devoutly praying for favorable action. Many have now worried through several lean years waiting for the completion of the government's work and the turning of

water into their fields. Deprived of the relief resulting from the old scrip issue and with the prospect of still further delay in the arrival of water, they see only starvation or departure from the lands on which they had hoped to make homes.

While Secretary Ballinger is rightfully guarded in his statements as to the course he wishes to pursue, until such time as he has made a thorough investigation of conditions in all districts, it can be predicted that he will finally reach a decision to take prompt steps toward the solution of the problem.

It is claimed that the economy in construction would more than balance the interest on these bonds, while the government loses none of its security in the final liquidation of the indebtedness. Senator Borah predicts that a recommendation from the Secretary of the Interior will result in early authorization for the bond issue.

Irrigation Age Plans Exposition Number.

Convinced that the United States Land and Irrigation Exposition, to be held at the Chicago Coliseum, November 20 to December 4, must wield a mighty influence on the future history of the west, THE IRRIGATION AGE has heartily joined in the work of making this exhibition awaken the east and the middle west from the lethargy of the last decade.

The eyes of a continent are already turning toward the blue hills, the sheltered valleys, the pure air and the bright sunshine of a vast empire of plenty between the Rockies and the coast Sierras. Capital, restless and penetrative in its search for Increase, is flowing in golden streams into every state from Texas to Washington and Montana to California. Earth, stone, cement, steel, supplemented with modern day mechanics and calculations, have entrapped the rushing waters that for centuries have dashed recklessly down canon and valley, and within a season have turned their tide, subdued and tractable, upon parched lands that shall blossom forevermore into waving fields and smiling gardens.

Yet the work is but half finished. People are needed. The skilled hand of man must direct the plow, the seeder and the reaper. There is an earnest call for the pomologist, the fruit grower, the produce raiser, the artisan, the mechanic and the retail merchant. A new country, a grand country is opened and the vanguard of freedom lovers and home builders is already beyond the snow-capped Rockies.

Realizing the peculiarities of human nature, and the demand for reliable information relating to the various projects now in process of development in the west, THE IRRIGATION AGE is preparing the issuance of a November number which shall be distributed liberally at the United States Land and Irrigation Exposition and shall direct the attention of visitors to those districts where the publisher has confidence in the management and the ultimate success of the undertaking.

Aside from special articles and illustrations, calculated to make this issue the greatest ever attempted by any journal exploiting the value of western irrigation land, there will be interesting facts and information for all readers who have heretofore taken no interest in reclamation work. It can be predicted that visitors who secure a copy of this issue will carry it to their homes for careful perusal.

In outlining this work THE IRRIGATION AGE bespeaks for itself the support and co-operation of all irrigated land sellers. More than 25,000 extra copies of this edition will be placed with visitors at the exposition, and because of the reputation already established by THE IRRIGATION AGE for cleanness of both its advertising and news columns, it can be predicted that patrons of its "exposition" number must reap gratifying returns.

Settlers Complain Against Abuses.

One of the most consistent and frequent complaints by settlers as filed with the Senate Committee on Irrigation and Reclamation of Public Lands during its recent trip through the West, is that in connection with the liability of large increase in the water cost between the time when the government begins work and the final distribution of water to the farms.

Notices of these increases, as published in THE IRRIGATION AGE, have not been infrequent and have tended to discourage settlers. It was to be expected that land owners would not allow the Senate committee to pass their districts without making protest over this objectionable feature of the reclamation bureau's work.

Of the many resolutions presented to the Senate committee, the following is typical:

"Appreciating the intent of the honorable secretary of the interior and the United States senate committee on irrigation, to verse themselves on the actual conditions existing in the construction of the various government reclamation projects, by personally inspecting the works, and hearing complaints by personal meeting with the settlers interested;

"Therefore, the representatives of the following project: The Klamath, North Platte valley, Strawberry valley, Gadren City, Milk river, Williston, Truckee-Carson, Orland-Unit, Buford-Trenton, Uncompahgre valley, in meeting assembled in Salt Lake City this eighth day of September, 1909, present these urging needs of the people connected with the foregoing projects;

"We heartily indorse the reclamation law and appreciate the beneficial results obtained from the reclamation of the arid lands by the government.

"But, whereas, the people who accepted the government proposition to construct irrigation systems under the act of congress of June 17, 1902, did so assuming that the law as passed was mandatory in its provisions and conclusive in statement.

"And, whereas, relying upon the act and statements made by the government engineers as the source of our information on what we were to receive;

"And, whereas, relying upon the law, and estimates furnished us by the government engineers, we voluntarily

signed contracts for water and pledged our land and homes for the payment thereof;

"And, whereas, after these contracts had been secured, based on the estimated cost of the engineers, the reclamation law has been so interpreted that the actual cost instead of the estimated cost of construction is charged against the land.

"And, whereas, these liens on the land and homes were given on the estimated cost furnished by the government engineers.

"And, whereas, section 4 of the reclamation law specifies that the said charges shall be determined with a view of returning to the reclamation fund the estimated cost of construction and that only;

"Therefore, be it Resolved, That the estimated cost of projects on which these liens were secured be the amount the settlers and water users should be required to pay.

General resolutions similar to the following have also been presented by the representatives of several reclamation projects:

"We further beg to recommend the following changes in the reclamation law:

"First—That the time of payments for construction charges be extended from ten to twenty payments, or in lieu thereof, that the water users be given the use of water for three or five years without charge, or a form of graduated payments be adopted to enable the settlers to get the land under cultivation, and on a paying basis and making it possible for them to meet their obligations.

"Second—That the first clause of section No. 6 of the irrigation act be interpreted as mandatory, that operating and maintenance charge be paid from the reclamation fund as provided in said section 6.

"Third—That the engineers themselves of reclamation projects be required to make a statement quarterly of the amount expended and for what purpose.

"Fourth—We recommend that the residence restriction as imposed by section 5 of the irrigation act be removed.

"Fifth—That the operation of the homestead law be restored, so that final proof may be made either by commutation or by settlement, and when so made patents shall be issued therefor, subject to the government lien for construction charges.

"Sixth—That the co-operative plan of construction, as heretofore in operation, be legalized and operated under government supervision.

"Seventh—We beg to submit to your honorable body that these recommendations are based on actual experience, and by men who are actual water users and owners of land pledged to the government for the payment of construction charges, and therefore, we trust that these will be given due consideration."

While the commitee has doubtless been assailed by many improper and unfounded complaints, yet there are involved in the above resolutions problems of vital importance to settlers. Under former administrations they have found no opportunity to make united protest over conditions, and it is to be hoped that the senate committee will take all steps within its power to change the status of affairs where settlers are subjected to heavy expense and impediment in their attempts at home-building.

TAFT TO OPEN DAIRY SHOW.

President William H. Taft has accepted the invitation of the National Dairy Show Association and will open the big ten-day exposition of the allied dairy interests in the Auditorium, Milwaukee, Wis., Thursday evening, October 14, by pressing a button in the El Toro Hotel, Grand Canyon, Colo., which will set the machinery in motion. Accompanying the signal which will open the Fourth Annual Dairy Show will come a message to the dairy farmers of the United States by telegraph which will probably be delivered by Colon C. Lillie, president of the National Dairy Show Association.

HITS BALLINGER'S ACCUSERS.

President Taft Absolves Secretary of Interior from All Blame—Shows that There Was no Loss of Power Cities.

For the benefit of those readers of THE IRRIGATION AGE who have not access to publications submitting the full text of the President's letter relative to the alleged water-power trust, and the veiled charges against Secretary Ballinger's policy, as suggested by Pinchot, Pardee and others at the National Irrigation Congress in Spokane, there is herewith presented the full text of this section of his letter:

"I cannot close this letter without referring to certain other matters connected with your conduct of the Interior Department which have been unfairly used in the public press to support a general charge that you are out of sympathy with the declared policy of this administration, following that of President Roosevelt, in favor of the conservation of national resources, especially in connection with coal lands, with water power sites and with the system of reclamation of arid lands, which are all within the jurisdiction of the Interior Department.

"In the first place, it was charged on the floor of the irrigation convention at Spokane by former Governor Pardee of California that you had restored to the public domain for settlement certain lands which had been withdrawn by the last administration for the purpose of conserving water power sites, and that after complaint made thereof you had subsequently withdrawn some of the lands again from settlement; but that meantime, between the one act and the other, an opportunity had been given to the so-called 'water-power trust' to file entries and obtain vested rights in valuable water-power sites in the state of Montana.

"At the same time that this charge was made by Governor Pardee there appeared in the public press, in a telegram which seems to have had the widest circulation, a statement quoted from a Montana paper that a water-power company with a capital of $10,000,000 had in the interval between the order of restoration and the order of withdrawal located and obtained vested rights in 15,000 acres of land in Montana, which absorbed for the company all the valuable water-power sites in that state, and the statement was accompanied by detailed reference to the particular land office and the particular agent through whom this result was accomplished.

"The inference which it was sought to have drawn, and which was drawn by newspapers hostile to you, was that you had brought about the restoration to settlement of the land upon which were the water-power sites for the purpose of enabling private water-power companies to acquire vested interests; that after doing so you had then withdrawn what remained of the public settlement, and that you took this course because you were out of sympathy with that policy of conservation of national resources and were in favor of the corporate control of such water-power sites.

"When the facts are examined in this regard it will be found that the persons responsible for the circulation of these charges have done you a cruel injustice. The fact was that in January, 1909, in the last administration, executive orders were made withdrawing from public settlement 1,500,000 acres at the instance of the reclamation service for conservation of water-power sites.

"Soon after you became secretary of the interior you brought this order to my attention and said that it included a great deal of land that had no water-power sites on it, running back many miles from the rivers, and that included much land which ought to be opened to public settlement; that you had applied to the reclamation bureau to know whether it was desired for reclamation purposes and what their recommendation was in the premises, and that they recommended that it be returned to the public domain.

"You also advised me that it was possible to secure from the geological survey an accurate statement of the water-power sites which were available, and which might be subjected to private ownership, and that you would direct

the geological survey to make such statements, and that then there could be made temporary withdrawals of the land needed to preserve these water-power sites until Congress could act.

"The order revoking the withdrawal of 1,500,000 acres was made in April. Sufficient information was procured from the geological survey to permit an order withdrawing the land upon which were water-power sites in May, and this withdrawal covered about 300,000 acres, instead of 1,500,000.

"The form of the new order of withdrawal was such that it set aside all filings and entries of any kind which had been made prior to its going into effect, and, as a matter of fact, not one single filing has been attempted on any of the water-power sites since the original order of withdrawal in January, 1909.

"The story as to the 15,000 acres in Montana circulated by publication in the newspapers, when presented by Governor Pardee, was reduced to 158 acres near the Missouri river in Montana, or four tracts of forty acres each, and now turns out, from examination of the records, that these filings were refilings of entries made ten years before; that the refilings were made on the 11th of June, 1909, more than two weeks after the withdrawal of the water-power sites in Montana, and that the four tracts of forty acres each filed upon have no water-power sites on them at all.

"It further appears from a report of the director of the geological survey that the order of withdrawal of January, 1909, was hastily made by townships and by reference to inadequate maps; that it included large areas not within miles of any river or stream, and that it failed to include many valuable water-power sites in the immediate vicinity.

"From the same reliable source it is learned that under the withdrawals made by your department from time to time, beginning in May last, there are now withheld from settlement awaiting the action of Congress, fifty per cent more water-power sites than under previous withdrawals, and that this has been effected by a withdrawal from settlement of only one-fifth of the amount of the land.

"In connection with the same charge, weight has been given to the fact that you have declined to carry out the contracts made by the reclamation service with homesteaders and entrymen by which certificates were issued to entrymen for work done and material furnished with a view to enlarge the projects of the reclamation bureau. You brought up the question of the legality of such certificates in a cabinet meeting, and were directed to submit it to the attorney-general. That officer has, very properly in my judgment, decided that it is at variance with an explicit prohibition in the reclamation law to issue such certificates. The fundamental mandate of that law is that no project shall be entered upon until there is money enough in the reclamation fund to pay for the project or the part thereof contracted for.

"The certificate system is in fact a system for borrowing labor and material and making the government a debtor to intending settlers—a system that is inhibited by law and cannot but result ultimately in disaster. Of course, those who have accepted such certificates for labor and material in good faith ought to be recompensed, and I shall ask from Congress at the next session especial relief for them. Meantime, the work of reclamation should be carried on wherever funds are available with all the dispatch possible, and I am assured that this is being done.

"I hope that after you have made personal investigation of all the reclamation work and looked into the finances of the undertakings, you will be able to make a report to Congress showing exactly what has been done, what ought to be done, and what additional legislation, if any, is needed and ought to be passed to further this great and important work."

FARMERS' NATIONAL CONGRESS.

Announcement and preliminary program for the Twenty-ninth session of the Farmers' National Congress, to be held at Raleigh, N. C., indicate that many able speakers will be present and that visitors may expect instruction and wide information from the addresses. Sessions will be held November 3-9. Information as to accommodations, etc., will be secured by writing B. Cameron, President, Stagville, or George M. Whitaker, Secretary, 1404 Harvard St., Washington, D. C.

PLEA FOR NEW MEXICO.

Speaker at First National Conservation Congress Awakens Interest in its Boundless Resources.

Called upon for an extemporaneous address before the Seattle Conservation Congress, W. A. Fleming Jones, secretary of the New Mexico Conservation Commission, spoke briefly but glowingly of the historical as well as the future commercial interest that must center in the southwest. In part he said:

"There is probably no section of the United States, Mr. Chairman, that is less known, in the east, and in other sections of the country, than the territory of New Mexico, and certainly none that is more frequently misrepresented.

"A feature of New Mexico that is much misunderstood and misrepresented is the character of our native population. We have practically none of the peon class and a very large number of our native citizens own their own farms and ranches that have been in the same family for generations. They are scrupulously honest, and a courteous, peaceful and law-abiding people, and much better fitted to enjoy full citizenship than many of the imported denizens of the slums of our great cities.

"We have vast areas of irrigable land, and with our 347 days of sunshine in every year and the most equable climate in the world we can and do produce every crop in abundance that can be produced in our latitude. Our alfalfa fields cut from four to six crops in a single season, running from eight to ten tons to the acre. The reclamation service is engaged in constructing in the Rio Grande valley one of its largest projects at a cost of upwards of $8,000,000. The reservoir when completed will store a four years' supply of water and will reclaim 210,000 acres of land—140,000 acres in New Mexico, 45,000 acres in the state of Texas, and 25,000 acres in the Republic of Mexico, the whole cost to be repaid by the owners of the lands.

"The history of our commonwealth is one of which all New Mexicans—both of Spanish and Saxon blood—are justly proud. Before the Pilgrim Fathers landed at Plymouth Rock the padres had traversed the deserts of the southwest and planted missions in the towns of the various tribes of Indians, and before a Saxon had set foot in New England, Juan de Onate had firmly established European civilization at Santa Fe. The whole territory is rich in memories of great names and heroic deeds; in relics of the Conquistadores—of the American pioneers; the Santa Fe trail and the Indian wars. Back of all these stretches a prehistory in which the imagination is lost. In Pajarito Park, some thirty miles from Santa Fe, are thousands of ruined homes of the forgotten people whom we call, for lack of a more descriptive and scientific name, the Cliff Dwellers."

MEASURING WATER.

The following, credited to the Pelton Water Wheel Company, gives a simple explanation of a method by which any one of ordinary intelligence can easily and accurately measure the water of a stream or ditch.

Select a stretch on a stream or ditch which will afford as straight and uniform a course as possible, avoiding pools and obstructions to the normal flow. If the water is at any point carried in a flume it is better to measure at this point. Lay off a distance of, say, 100 feet; measure the width of flowing water at about six different places in this distance, and obtain the average width; likewise at these same points measure the depth of the water at three or four places across the stream, and obtain the average depth. Next drop a float in the water, noting the number of seconds it takes to travel the given distance. From this can be calculated the velocity of the water in feet per second. The cubic quantity is the product obtained by multiplying the average width in feet by the average depth in feet by the velocity, which (in feet per second) will give the flow of the stream in cubic feet per second. From the figures so obtained it is advisable to deduct about twenty-five per cent, as the surface velocity of water is in excess of the actual speed velocity.

Send $2.50 for the Irrigation Age 1 Year, and the Primer of Irrigation.

President Taft Opens Gunnison Tunnel of Colorado

Surrounded by a brilliant assemblage of officials from the state of Colorado, and representatives of the United States government, President Taft pressed the button on September 23, and by electric signal to workmen stationed at the distant end of the completed underground waterway, opened for operation the greatest irrigation project of the present day—the Gunnison tunnel of Colorado.

The scene was picturesque. On a temporary platform high above the opening of the Uncompahgre end of the tunnel stood the president with hand upon a miniature bell, the gift of Montrose citizens and the means by which the signal must be flashed across the mountain. As the president placed this bell on a copper disc, establishing electrical connection, and the workmen began the destruction of the board barrier to the waters, several thousands of citizens gathered along the big ditch near the president's stand broke into hearty cheers and other expressions of delight.

Uncompahgre Project, South Canal Division, Showing Series of Drops.

Previous to the brief ceremonies connected with the opening, the president had passed the day in the fertile valley. Almost the whole population of the district had gathered to celebrate his arrival. Many opportunities were given him of viewing the valley and learning of the marvelous productiveness of the fields under proper irrigation.

Briefly reviewed, the Gunnison tunnel is approximately 30,000 feet in length, has an average cross section of 10½x 11½ feet, and will carry a stream of 1,300 cubic feet of water per second. The head is in the bed of the Gunnison river, from which there is a descending entrance, thus insuring a maximum flow of water so long as the Gunnison river shall carry the volume in its bed. On the Uncompahgre side is a series of falls between the level of the tunnel and that of the ground to be supplied with water. These falls will supply power for commercial purposes at cities and villages in the valley.

While there are at present no government lands to be opened for public entry in the Uncompahgre valley, yet the government has secured control of all previously existing ditches and laterals and settlers are required to buy water rights at a figure that must return to the government the whole cost of the engineering work, named by the president as about $6,000,000.

In length the valley of the Uncompahgre is about forty miles long and twenty miles wide. It is claimed that about 40,000 acres will be supplied with water at once and that when the system is complete nearly 150,000 acres will have been reclaimed. For several years settlers placed dependence upon the Uncompahgre river for their supply and an imperfect system of laterals and ditches was maintained. The river failed several years ago, and because of the lack of rainfall settlers were gradually abandoning their homes and moving to other sections. The Gunnison river is said to be a never-failing supply and it is anticipated that water for Uncompahgre lands is now assured for all time.

Lands of the Uncompahgre valley are reported to be among the most fertile in the west. Because of the early effort at irrigation farming, their productiveness has already been demonstrated. Fruit growing is the most profitable work, but because of the distance from selling markets greatest attention has thus far been given to apples and peaches. Large shipments are made each year to Texas, California and eastern markets. It is said that the smudge pot has never been used in the valley and that the only fruit crop failure was in 1907.

In small fruits, strawberries, raspberries, gooseberries and blackberries are most profitable and it is claimed that remarkable yields can be anticipated. The vicinity about Montrose is particularly adaptable to berry crops. One

Richardson Ranch, near Montrose. Alfalfa Just Harvested Shown on Right. Orchard in Background. Spring Creek Mesa in Distance.

grower sold $1,350 worth of berries from one and three-fourths acres last year.

Land also seems adapted for alfalfa and grains. Until the present time there has been no beet sugar factory in the valley, but negotiations are now pending and it is predicted that a plant will be in operation before the 1910 crop has been gathered. Potatoes do well and 400 bushels to the acre is said to be an average yield.

In climate the valley enjoys the delightful sunshine and warmth without chill in winter or extreme heat in summer. No cyclone has yet been chronicled. Hail-

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Some Fundamental Principles of Irrigation Law

Clarence T. Johnston, State Engineer of Wyoming

For over forty years the Anglo-Saxon of America has given his time and energy to the reclamation of the arid lands of the West by means of irrigation. As he has conquered Nature wherever his lot has been cast throughout the world, so has he succeeded in building canals and reservoirs and in bringing water to lands that only need moisture to be productive. His success in a material way has been marked. Unlike his brethren of Egypt, India and Australia, he has not protected the fruits of his conquest by the enactment of laws and regulations which insure perpetual stability and guarantee the peace and prosperity of the individual water user. We have built wisely on the ground, but we have failed to take those precautions which insure lasting security to a rural population.

Under the general government, the control of non-navigable streams is reserved to the states and territories. It would be presumed that these states and territories would accept this responsibility in a way that would guarantee protection to all who use water beneficially. The Englishman, the German and the Frenchman naturally know but little concerning irrigation and irrigation principles when they are sent by their own governments to restore peace and order commercially in new territory gained by conquest. Wherever irrigation has been necessary under the flags of any of these nations, the wisest laws and regulations have been put into effect contemporaneously with the commencement of irrigation development on the ground. Italy and Spain have been visited by agents of these nations in order that the experience gained in these older irrigated countries might be applied for the protection of the citizens whose livelihood depends upon a wise and just distribution of the available water supply. As a result of this policy, countries that have been irrigated for thousands of years under native rule are, under these new conditions, making remarkable progress. India, Egypt and Australia, as well as the provinces of South Africa, are examples of this kind. All foreign countries which have developed along irrigation lines provide a special administration for determining rights to use water and for protecting such rights after they have been defined.

Before it is possible to provide an efficient irrigation administration, it is necessary to understand what principles must be recognized in the law to bring order out of chaos and to furnish the relief sought. After forty years of practical experience in the field, the states and territories of the West have not thus far attempted to come to an understanding or agreement as to a single important principle that should be generally accepted. We attend the Irrigation Congress annually. This is the seventeenth such session. Much of the time of the congress is consumed by paid moulders of public sentiment, advertisers and politicians. The majority of the resolutions adopted each year by the congress have no direct bearing on the vital questions we should consider. We have been tangled up with the Natinal Irrigation Association and with forestry organizations in a way that is inexcusable. Neither have anything to do with irrigation. The members of none of these organizations can help us to arrive at conclusions which will benefit the water users. The congress has been used to some extent as a catspaw by those who are employed to attack the public land laws. While such a campaign is based wholly on selfish, mercenary grounds, yet the agents who appear before the congress submit data, evidently having some sanction of government officials, which would lead the uninformed to believe that our land laws are not suited to western conditions. The argument they make is that our public lands are going into private control too rapidly. The truth is that progress along these lines is entirely too slow. It is possible that a campaign which would result in the restriction of the land laws by rules and regulations would add to the value of land scrip held by some of the great corporations of the country. It is possible that those who hold such land scrip are farseeing enough to recognize that it will repay them many fold to hire agents to work up a public sentiment against the land laws. This probably explains the presence of some delegates from the east and makes clear the reason for their activity and their great concern in the disposition of the public domain.

We will be more or less bothered by those who believe that the resources of the country have been nearly exhausted. This class should be assigned as perpetual delegates and life members of some sanitarium rather than be classed as representing those principles for which the Irrigation Congress should stand. This cry for conservation is as foolish and childlike as are many of the theories of those who have led in movements of the kind. The government employs men to study geology and to ascertain as to the visible supply of material on which commerce and prosperity must, in a large measure, depend. Those who have traveled and have studied extensively in the field are satisfied that the estimates of these compilers of data are as far from the truth as it is possible to be. The effect of the widespread advertising as to shortage of one commodity or another has been injurious to the nation at large. There is nothing gained by employing men simply to scare the people. Some dependence should be placed on government reports. Many of those issued relative to the conservation movement are nothing but danger signals, without tangible evidence of real danger. Adam could have spent his time worrying as to the water supply. The Pilgrim Fathers could have wasted their energies in campaigns of conservation. It is fortunate that those who have gone before us have given their time to development work, rather than in day dreaming. It is certain that Mother Earth will supply our tables and clothe our children for generations to come. We must be up and doing. Let us conquer the obstacles that Nature has imposed, and make ready for a greater population and a higher civilization. Let us have confidence in the wisdom of the Creator. Let us believe that to date we have just touched the surface of the ground here and there, and that the vast wealth of the Earth lies yet unknown in extent or character. It is remarkable that our scientists have discovered enough coal already to last us for several hundred years. They should not induce a panic, because through their puny efforts the Earth has not been more fully explored. Departments of the government, which have time to advertise impending catastrophes and preach conservation only, should be weeded out and bu-

reaus having some practical aim should be substituted for them. We have had more senseless matter published relative to forests than we need. Every man loves trees. No department of the government should take advantage of this natural sentiment to advertise all kinds of approaching calamities because some trees are being destroyed each year. No department of the government presuming to stand for scientific attainments can be excused for attributing benefits from forests which science must deny. When it becomes profitable for the land owner to grow trees on a commercial scale, he will do so. The people of the west are planting more trees than they are destroying. Let the government protect the public forests from fires and careless cutting and encourage a lumber commerce. Allow the settler all rights in the public forests that he has enjoyed from the earliest days of the Republic. The Irrigation Congress should not concern itself in supporting any department of the government or of the state which tends to restrict progress and development.

If the Irrigation Congress does not have for its object some educational purpose along irrigation lines, its value to the west is not great. The congress should at least consider questions of development, if it is not disposed to take up the broader problems relating to colonization and the principles of irrigation law and administration. The average delegate delights in generalities. Pretty phrases commending the reclamation and forest services appeal to him. What definite ideas has he relative to policies that should be embraced to further the work of the Reclamation Service? Does he believe that this work should be so conducted that projects will be taken up in less number and those actually exploited be hastened to completion? Has he any idea as to the wisdom of restricting settlers to 40, 80 and 120- acre tracts instead of allowing all to select the limit of a homestead entry, 160 acres? Does he believe that the government should greatly concern itself in irrigation development where private capital promises equally good work and equally cheap water rights?

If the Irrigation Congress can not assist the Reclamation Service in its work except by passing meaningless resolutions, its place as a factor in such development is a blank. If we can not help private enterprise in all legitimate development, we have but little reason for maintaining an organization. In my judgement, we should go further. There are more important matters for us to consider. The construction of irrigation works and the reclamation of lands are strictly engineering problems on the ground. The national government and each state administration should bend every effort to direct settlement, to the end that the best people may be brought to occupy our irrigated lands in the shortest possible time after water is ready for them. The future greatness of the west depends on the character of the rural population that we secure now. We should do something to assist the water user who, without a stable state or territorial administration, is left defenseless after the Reclamation Service and private enterprise retire from their physical labors.

Those interested in irrigation questions have been meeting annually for seventeen years. During all of that time this congress has not accepted a single fundamental principle relating to colonization or to the control of streams. We leave all of these questions, which should be studied from the broadest standpoint and applied generally, when found, to furnish the relief sought, to the courts of the various states and territories. This is an injustice. It is a burden on our tribunals of justice that should never be imposed. Courts can and will do everything possible to settle controversies among the people of the states and territories. The courts can receive testimony relating to appendicitis and issue decrees of a medical nature. The courts can take the place of our boards of health, when properly informed by competent testimony. All questions might be brought to our departments of justice. As the race has grown in wisdom, it has been found best to trust special and technical questions and administration to specialists. This brings prompt relief to those who demand it, and enables the public to protect the individual as the individual deserves at the hands of the public.

The arid states and territories were fully represented at the Irrigation Congress. We assemble to discuss irrigation. Regardless of the pride we take in the history of our congress, we have accomplished so little. We have no settled policy as to the best method for carrying on the construction of irrigation works. We have no well defined ideas as to colonization. We can not say in unison that water belongs to the states and territories in perpetuity, or even that it belongs to the public. One state or territory may complicate the use of water for irrigation with the claims of riparian proprietors. Another will allow its citizens to claim all the water in sight and hold it as personal property, thus robbing individuals and communities that might make a beneficial use of the same. Nearly all of the states and territories provide what is called an irrigation administration. By cunning manipulation in the law-making bodies, many of these officers who should be active and of some service to the water users, are robbed of executive authority. This is done at the instance of those who wish to continue an uninterrupted traffic in water and water rights, regardless of the presumed rights of the actual water user or the community in which they operate. The courts have naturally found irrigation questions to be trying ones. It is natural that court decrees, even in the supreme court of a single state, are conflicting. The reason for this is that the fundamentally important principles are not embraced in the law. The courts have considered and decided the question as to the ownership of water until the deepest irrigation student is in a dazed condition when he reviews the various decisions relating thereto. Practically all other problems of utmost importance to water users are in the same condition of uncertainty.

It must be admitted that the signs of the times point to a growth of some sentiment which promises, in time, a solution of these problems. This change has not been brought about or encouraged by the Irrigation Congress or by those who should stand for what is right in our law-making bodies. Thought along these lines is being crystalized by demands from the water user, himself, and by those who are leading in the development of the west through private enterprise.

Unlimited traffic in water to suit the personal and financial interests of a few has been detrimental to the large body of water users. We should recognize this. We place ourselves on record should we say that water always belongs to the state or territory in which it is used, and that the right to use should be limited to the extent of beneficial application of the water that is made

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Reclamation Notes

Under this heading, THE IRRIGATION AGE will hereafter run reports and news relating to irrigation projects—both government and private—gathered from the various sources at its command. Readers of the AGE are requested to assist the editor by sending reports of local projects, new organizations or progress of outlined work in their vicinities.

COLORADO.

The board of directors of the Otero irrigation district are planning extensive improvements.

The Boyd Lake irrigation district is investigating the advisability of including within its system a part of the lands in Weld county.

Articles of incorporation for the Kingsbury Reservoir & Land Company have recently been filed. Headquarters of the company are at Greeley, and it is proposed to irrigate about 3,000 acres in Elbert county.

A trust deed to cover a bond issue of $350,000 was recently filed at Pueblo by the Teller Reservoir & Irrigation Company. It is proposed to construct ditches for distributing water to the lands held by the company.

The Northern Colorado Power Company reports success in its experiment of supplying power for pumping purposes. It is claimed that farmers near Greeley are arranging for the installation of pumps to irrigate.

Directors of the Bent and Power irrigation district are said to be considering the advisability of issuing bonds in order to construct a system of irrigation. Engineers employed by the district submitted a favorable report.

Greeley capitalists are reported to be investigating the old Lincoln county canal built years ago by E. E. Baker, with a view to investing about $300,000 in a complete and comprehensive irrigation project involving the constructing of reservoirs on the Big Sandy to water 10,000 acres.

Thomas Daley and W. H. Moore have filed application for 30,000 acres of land in Pueblo county for irrigating purposes. Daley wishes to have the land sold to him, when he and Moore will erect an irrigating ditch. A tract of 40,000 acres was sold by the land board recently on the same terms as Daley wishes.

On petition of thirty or forty applicants, apparently working in behalf of parties whose identity was not revealed, the state land board recently ordered the sale of 12,000 acres of desert land in Pueblo county. The land brought from $7 to $12 an acre. An effort will be made to irrigate the area and settle it with colonists.

The project known as the North Sterling irrigation district is said to be financed and now ready to proceed with the work of building the system to irrigate 80,000 acres in Logan county. The land lies on the north side of the Platte river. Farson Son & Co., of New York, are reported to have purchased bonds to the amount of $2,080,000.

Articles of incorporation of the Riverview Land & Irrigation Company have been filed with the county clerk at Greeley. The incorporators are: Z. X. Snyder, president of the State Normal school; F. M. Hadden, a member of the faculty; Victor Keyes and William E. Day. The company will undertake the development of a 1,500-acre tract which includes the town site of Sublette, 30 miles east of Greeley.

John Gaffy and John A. Keefe, of Denver, and James Mosier, of Park county, have filed maps and plats for the construction of a 190 foot dam across Tarryall creek for the irrigation of a tract of 81,000 acres in eastern Park county. Water will be carried down the Tarryall and through the Platte to a point of diversion to be determined later. It is claimed that $1,000,000 will be required to reclaim the tract.

The Garden Park Irrigation Company and the Park Center Land & Water Company will begin work at once on a storage reservoir and dam nine miles northwest of Cripple Creek, which is to irrigate the Park Center and Garden Park ranch districts. Water will be furnished from Four-Mile creek. The dam will be eighty-four feet high and the lake half a mile by one and a half miles in dimensions. The work is to be completed about March 1, 1910.

It is reported that the Costilla State Development Company, in which Denver capitalists are interested, is planning to place on sale the 300,000 acres composing this grant. It is claimed that the company has planned the expenditure of $1,000,000 on irrigation works and that other large sums will be spent in developing mines and water power. D. H. Moffatt, of Denver, is heavily interested in the three companies formed to develop resources of the Costilla grant.

Twenty thousand additional acres of land will be watered by the Dallas Divide & Reservoir Company, a corporation which has been formed by local men. John I. Nowland of Paonia is the president and J. V. Lathrop, a hardware merchant of Montrose, is the secretary and treasurer. Nowland recently organized another company known as the Nowland-Thomas Ditch Company which will water 12,000 acres. All of the land is situated on the high mesa between Montrose and Ridgway.

Eastern capitalists under the name of the Great Northern Irrigation & Power Company are said to be planning the construction of a dam one mile wide and about 250 feet in height in Routt county. Preliminary maps and surveys have been filed with the county clerk at Denver but it is stated that final plans cannot be outlined until engineers have presented full reports. L. M. Hughes is attorney and G. G. Anderson is consulting engineer for the new company. The company proposes to generate water power and irrigate about 100,000 acres.

On September 2 the Pueblo-Rocky Ford Irrigation Company filed in the office of the county clerk at Pueblo, a mortgage for $2,000,000 made to the Chicago Title & Trust Company and Harrison B. Riley. It is stated that this sum will be required to construct an irrigation system for use in the Orland and Ambursen dirtricts. This land lies to the south and east of Pueblo. W. N. Cox, W. J. Lester and Fred Harris are interested. The company has recently concluded the purchase of 23,000 acres of land from the state at a cost of $12 per acre.

The Fox Smith Construction Company of Florence has secured the contract for the completion of the Sheafer dam for the Beaver Land & Irrigation Company at Penrose. The contract is for $125,000 and is one of the largest ever let in Fremont county. The work will be started by October 1 and must be completed by June 1, 1910. When finished the dam will be ninety-two feet high, 400 feet wide at the bottom and 1,050 feet wide at the top and 100 feet thick at the base and twenty feet thick at the top. It will have an impounding capacity of 5,000 acre-feet, sufficient to irrigate the company's entire holdings in Beaver park. J. Q. MacDonald has resigned as general manager of the company, to take effect October 1. He will be succeeded by J. J. Cogan of Penrose, manager of the Beaver, Penrose & Northern Railroad.

By the signing of a contract between the Laramie-Poudre Reservoir & Irrigation Company and the Greeley-Poudre Irrigation district, organized last April, final arrangements have been made for the construction of a system to irrigate nearly 125,000 acres lying north and east of Greeley and including the towns of Ault, Nunn and Pierce. By the agreement the irrigation company will construct the reservoir and canals and guarantee completion before Dec. 1, 1911, and the district agrees to the purchase of the plant for $5,000,000 for which it proposes to issue bonds. The irrigation company proposes to use a series of reservoirs in the Laramie and Poudre rivers and along the main line of the canal. About 300 miles of ditch will distribute the water. From the Laramie the water will be sent through a tunnel two miles long into a branch of the Cache la Poudre and will be taken up by ditches at the north end of the canon. To store water there will be constructed a 200-foot dam in the Laramie river and this will be supplemented by a series of large reservoirs. Five concrete storage basins will be built on the plains. It is anticipated that the forthcoming vote of property holders will be favorable to this agreement.

NEW MEXICO.

Work has commenced on the dams and reservoirs of the Arroyo Honda, five miles south of Santa Fe, for the reclamation of 10,000 acres at an estimated cost of $350,000. Three concrete and steel dams will be built.

Mimbres valley farmers have entered into a contract with an Ohio gas engine company for a modern pumping plant sufficient to irrigate 12,000 acres. It is reported that other farmers in Luna county are planning similar irrigation.

O. A. Meinzer of the United States Geological Survey has expressed the opinion after careful investigation that nearly the entire Estancia valley may be irrigated by pumping. Great interest has centered in his work, and it is reported that farmers are busy in perfecting business organizations to install pumping plants.

The Springer Ditch Company recently secured a temporary injunction against the French Land and Irrigation Company at Las Vegas, preventing the latter from taking water from the Cimmarron and Ponil rivers and Carizozo creek. The Springer company complained that the defendant had appropriated all the water from these streams in violation of its prior rights.

Land owners in the Portales valley have arranged for the installation of a pumping plant sufficient to irrigate 12,000 acres at once and to be doubled in capacity when desired. It is claimed that nearly 150,000 acres in this section of the state may be irrigated by the deep-well system, and that the success of work at Portales will result in similar installations in adjoining counties.

Unprecedented floods in the northwestern part of the state resulted in immense damage to two irrigation projects early in the present month. The Black Rock dam of the government's Zuni irrigation system was damaged, and H. F. Robinson, a reclamation official, states that $100,000 will be required to repair the damage. The dam of the Bluewater Development Company was also partly destroyed. Resulting floods caused great loss of property to settlers on both projects.

WASHINGTON.

Farmers in the hill lands of Cowiche valley are experimenting with pumps for irrigation purposes and it is claimed that about 2,000 acres will be reclaimed by this method if experiments are successful.

The second filing this year has been made on the Big Klickitat river and tributary streams for irrigating the Horse Heaven country in Klickitat, Benton and Yakima counties. J. E. Blackmore of Seattle filed on over 2,000 cubic feet.

Inasmuch as the government has postponed work on the Big Bank reclamation project, land owners are planning to irrigate by pumping. F. B. Keighy is sinking a 295 foot well and if successful his example will be followed by numerous other settlers.

It is reported that a syndicate of New York bankers has taken a large part of the $500,000 bond issue of the Burbank Power & Water Company, of Seattle, and that the company is now in a position to prosecute its outlined work near the junction of the Snake and Columbia rivers in eastern Washington.

Contract has been awarded to Mr. D. H. Traphagen, of Seattle, Washington, for the construction of that portion of the distribution system under the Tieton project on Naches Ridge,, Washington. The work involves the excavation of 117,700 cubic yards of material. The estimated contract price was $31,500.

The affairs of the Adrian Irrigation Company, in which H. W. Mangold and fellow Socialists, of Spokane, planned to open a colony on the Rochdale plan, have been thrown into the superior court in a suit in which Mangold charged bad faith on the part of his associates and asks the court for a judgment of $100,000 damages against the company.

Reports from Spokane announce that the Arcadia Irrigation Company is defendant in a suit instituted by Andrew Thompson in which he asks return of money paid on a five-acre tract because the company has failed to keep its agreement. The Arcadia Irrigation Company is successor to the Arcadia Orchard Company.

The Republic Orchard Land Company of Minneapolis, under the management of Colonel I. R. Beery, will soon make improvements on its large tract of land near Goldendale. A camp will be established and a corps of workmen will develop and plat the lands. Power will be obtained from the Little Klickitat, by which water will be pumped on the upper lands.

Engineer Walter H. Graves, of Portland, in charge of the Pasco irrigation project, is making preliminary plans for the system which will deliver water to many arid acres at the lower end of the valley. So far 5,000 acres have been secured and water will be pumped to them from the Columbia and Snake rivers. It will be on the land, according to the promoters, in time for the spring planting next year.

Contract has been awarded by the Secretary of the Interior to Mr. H. W. Hawley, of Seattle, Wash., for the construction of Sulphur creek wasteway channel and structures in connection with the Sunnyside irrigation project, Washington. The work includes the construction of 4¼ miles of channel involving about 225,000 cubic yards of excavation, and the placing of about 1,600 cubic yards of rip rap. The contract amounts to $65,062.

Since the commencement of the Arcadia Irrigation Company's ditch, which will irrigate lands between Loon Lake and Spokane, all farmers having ditches running out of the lake have closed them. It is supposed that all bog land owners will oppose the present move, as they claim that as Judge Hanford ruled they must close their ditches they have a right to open up if the Arcadia company does. The question will undoubtedly be put up to the courts.

Frank McKean, general manager of the Rainier Power Company of Seattle, has secured control of power plants along the Columbia river from which 45,000 horespower will be developed. He has secured a contract on the lower 160 feet on the Chelan river at the Chelan Falls, paying $150,000. It is estimated that 15,000 horsepower can be developed at this point. A large body of land is also included in the contract, which will be put under irrigation.

The Tieton water users are considering the advisability of assessing a tax of $20 per acre to raise $400,000 for the purpose of aiding the government in prosecuting work on the Bumping Lake dam. It is reported that Secy. Ballinger advises that this money will be accepted if raised in this way and that work will proceed with rapidity whereas present funds will not allow the completion of the dam for many months. The government expects to complete Unit No. 1 of this project this year.

L. M. Rice, chief engineer and general manager of the Klickitat Irrigation & Power Company, announced that the sum of $2,000,000 has been pledged for the immediate completion of the project on which his company has been working for the past five years. This sum will allow the construction of vast reservoirs on the Klickitat river at the base of Mt. Adams, the erection of an electric power plant near Mabton and the erection of smaller pumping plants at Pasco and Coyote. It is predicted that within a year water will be supplied to more than 200,000 acres and that when the system is complete an aggregate of 500,000 acres will receive water from this project. Water will be carried through ninety-one miles of main canal and pipe line.

Workmen in the employ of the government are building a large dredge at the Sunnyside canal in the Yakima valley, west of Spokane, on the lines of a special design prepared by the Bucyrus Company of Milwaukee, which sent one of its head men to Sunnyside, Wash., to examine the work before submitting a bid. The present water supply is inadequate for the irrigation of the rapidly growing Sunnyside project and it was decided to increase the capacity of the canal, which is now 600 second-feet, to a maximum of 1,080 second-feet, and increase of 70 per cent. An excavator was put to work on the upper bank of the canal just above the Harvey place. Below this point the canal is sufficiently narrow to permit the use of one which travels the bank because the boom can reach across and dump the dirt on the lower side. It is a slow process, because a road has to be made for the machine, the capacity of which is only 500 cubic yards per eight-hour shift. Many important advantages could be gained by a floating dredge, so the construction of one was commenced two months ago. Twenty-one men are now at work on it, and it will require six engines to operate it. Steam will be provided by two large boilers. This work will increase the irrigated area from Parket to Prosser and beyond,

which means many new homes, new orchards and fields and many millions of dollars to be taken from the soil.

IDAHO.

Because of failure to supply water as agreed, the Idaho Irrigation Company, of Richfield, has released settlers from payment for principal, interest or maintenance for water furnished this year.

Active work has been begun on the construction of a dam in the Council valley to reclaim about 25,000 acres. J. J. Allison is promoter of the company, known as the Lost River Irrigation project.

The Kuhn interests are said to be preparing a project for the reclamation of 54,000 acres in the Raft River valley in Cassia county. Filings have been made on the flood waters of Raft river and it is proposed to construct a dam 107 feet high and 1,500 feet long. The project was said to be dependent on the construction of the Utah-Burley railroad, now assured.

Land owners in the Gem Irrigation district, near Caldwell, voted to adopt the Trowbridge & Niver proposition for a gravity system for the irrigation of their lands. Water will be stored at a reservoir located on Jordan creek and carried twenty miles in the Owyee river to a point of diversion about twenty miles above Nyssa, from whence it will be conveyed in open ditches.

Engineering crews have started work on permanent surveys for the Kings Hill Extension Irrigation Company, which proposes to construct an irrigation system to reclaim about 20,000 acres lying along the Snake river bottoms between Glenn's Ferry and Medbury. Two great siphons will be constructed to carry water across the canyons of the Snake river for a distance of about fifty miles. Storage reservoirs will hold flood waters of the five creeks draining the Bennett mountains.

CALIFORNIA.

Francis Cutting, of Red Bluff, has filed on water rights in the Sacramento river and proposes to irrigate a large tract by pumping.

Eight hundred men will be put at work on canals and laterals for the irrigating system being established by Pittsburg capitalists in Colusa and Glenn counties.

Final surveys for the government's irrigation project at Iron canyon, near Red Bluff, have been completed and it is said that active work will be begun this year.

Orchardists in the vicinity of Yuba City have turned their attention to deep well irrigation and it is said that more than forty wells have already been sunk while many others are in contemplation.

Engineers are now working on plans to straighten the mouth of the Sacramento river and thus reclaim nearly a half million acres. Work to reclaim a 10,000-acre tract in the Egbert district has been begun.

It is reported that the Lassen Irrigation Company, of Johnstonville, is purchasing land at the head of Baxter Creek and proposes to construct a dam to form a large reservoir for waters of Baxter Creek and other small streams.

The meeting of property owners in Paradise, scheduled for last month, has been postponed. The Pacific Gas & Electric Company is promoting the formation of a district to which it proposes to supply power for irrigation purposes.

Directors of the Bend Colony Irrigation Company held a meeting at Red Bluff recently and decided to clear reservoirs and expend a considerable sum in improvements. Thos. Williams was chosen president and B. F. Stone was elected director.

Water Company No. 7 of Holtville has accepted what is known locally as the Schenck proposition. This will extend the water for irrigation to between 6,000 and 7,000 acres lying west of the Alamo river considered too high to be reached by the canals of water district No. 1, in which it is located. The construction of flumes, ditches, etc., will be undertaken this fall.

Congressman Needham and Dr. W. E. Clapp, of Los Angeles, are said to be interesting themselves in the formation of a Wright irrigation district in the West Side country near Modesto. Preliminary surveys are now being made and it is claimed that several sources of water are available. It is said that ranchers are willing to organize providing surveys indicate that a project is feasible.

Reports from Woodland, Yolo county, indicate a warm fight between the Putah Creek Irrigation Company and the Yolo-Solano Land and Water Company for possession of water rights in this vicinity. The latest move is a decision on the part of the former company to change its point of diversion to Cannonball rock on Putah creek about one mile from Winters. An amended application shows this change in plans.

In reply to the charge of landowners in the Turlock irrigation district that the sum of $89,000 is not needed for improvement and maintenance, the board of directors has issued a statement declaring that unless the vote on the special assessment is affirmative it will be necessary to collect in advance for water. They further assert that unless the special tax is authorized there may be litigation which will involve the district for several years before settlement. It is reported that the sentiment for the special tax is favorable.

Land owners in the vicinity of Oakdale have presented a petition to the county board for the formation of an irrigation district under the Wright law. The date of the election has been set for October 23. About 63,000 acres will comprise the district, two-thirds of which lies on the south side of the Stanislaus river. Messrs. Rodden, Gilbert and Crowe have made filings on the Stanislaus, Tuolumne and Calveras rivers. It is said that local sentiment is decidedly favorable to the formation of the district. In conjunction with the South San Joaquin district, already formed, it is proposed to purchase the water rights, canals and surveys of the San Joaquin Canal & Irrigation Company. The latter company is said to name a figure of $700,000 as its selling price.

UTAH.

Officers of the upper irrigation district at Theadore are offering bonds to the amount of $225,000 to complete the system.

Acting as trustee for the Buckhorn Irrigation Company, George A. Snow of Chicago has applied for the segregation under the Carey Act of about 30,000 acres in Emery county. The company proposes to expend about 300,000 in the construction of irrigation works to reclaim 40,000 acres, providing action by the government is favorable.

Frank Lott of Denver and several associates have recently succeeded in segregating about 35,000 acres in Wasatch and Uintak counties, to be reclaimed under the Carey Act. By constructing a canal about twenty-eight miles long from the junction of the Duchesne and Strawberry rivers, the company expects to expend about $500,000. Aside from the 35,000 acres involved in the segregation, the company intends to water about 15,000 acres now under private ownership.

Application has been made by the New Castle Reclamation Company for the necessary water to irrigate 16,640 acres of land in Washington county, the water to be taken from Pine Valley creek. The quantity requested is 3,000 acre feet, the flow being ten cubic feet per second. The point of diversion will be on the north fork of Pine Valley creek. The works will consist of a dam and canal, the latter to be 25,000 feet long, fifteen feet wide at the top and seven feet wide at the bottom.

At West Portage a company has been organized which will be known as the Portage Irrigation, Reservoir & Power Company, with headquarters at West Portage. Arrangements are now completed whereby the company takes over the irrigation systems in Sections 6, 10, 9, 2 and 17, Township 14 north, Range 4 west, Salt Lake meridian. C. W. Hall is president; William H. Gibbs, vice-president; R. C. Harris, secretary and treasurer. These officers, with J. F. Conley and John Heaton, form the board of directors.

The North Branch of the Western Irrigation Company, an association of twenty-five residents of the precinct of Farr West, Weber county, to operate an irrigation canal connecting with the canal of the Western Irrigation Company near a point on the line of the Southern Pacific in Weber county, has filed articles with the secretary of state. S. D. Rawson is president; Charles F. Larkins, secretary and treasurer, and these, with E. O. Williams and Jacob Thomas, are the di-

rectors. The capital is $10,000 in dollar shares fully paid up by the taking over of rights in the canal.

Articles of incorporation of the Mountain-Tunnel Irrigation Company of Mt. Pleasant, Sanpete county, have been filed with the Secretary of State, placing the capitalization at $16,800 in shares of $20 each. Officers of the company are: Alexander H. Poulson, president; John E. Madsen, vice-president; George Brown, secretary and treasurer, and these, with James W. McClenahan and N. F. Madsen, form the board of directors. The stock is fully paid up in taking over water rights owned by Alexander H. Poulson, Edmund C. Johnson and Asa Coates in Bacon Rind and Boulder canyons, east of Spring City.

Application has been filed in the office of the State Engineer by J. M. Lauritzen of Richfield for 500 cubic feet of water a second to be taken from the Virgin river. This application makes a total of 100,000 acre feet of water to be used and stored from January 1 to December 31. This water will irrigate 60,000 acres of rich land on the Virgin river. The point of diversion is four miles above Shonesburg, Washington county. The work includes a dam and canal, the latter with a diverting channel 10,000 feet in length, forty feet in width at the top and twenty feet in width at the bottom, with a grade of two per cent.

After a mass meeting at which the advisability of constructing a comprehensive irrigation system was exploited at length, land owners in Weber and Davis counties decided early in September to petition for the creation of an irrigation district to comprise about 56,000 acres in these two counties. It is reported that Chicago capitalists are ready to accept the district's bonds and to construct a system at a cost of between $3,000,000 and $4,000,000. The main canal will begin four miles west of Morgan, on the Weber river, and will extend to the extreme Davis county line, a distance of fifty-two miles, with a carrying capacity of six hundred second-feet or a capacity four times greater than the Davis and Weber county canal now in operation. Part of this water will be distributed at a point where the Weber river goes into the Uintah valley, the canal dividing into the north and south branches. The north canal will extend eight miles north, irrigating 6,000 acres in Weber county on what is known as the Burch Creek Bench, and extending as far north as Twenty-fourth street in Ogden City, to which point the canal has been surveyed. The south branch of the canal will terminate at the old White farm at Bonneville, giving the south branch a length of thirty-two miles and carrying the water to a point within four miles of Salt Lake City, irrigating 50,000 acres of land. It will take two years to complete the project.

OREGON.

To reclaim about 10,000 acres near Spray, Carl Wagner and Charles Royse have arranged to take water from the John Day river near the Spray dam. They propose to invest $10,000 in work and machinery.

Active work on the dam for the irrigation project in the Grande Rounde valley will be begun soon. The south ditch line has been surveyed and the north ditch is now being surveyed. About 20,000 acres will be watered by this project.

D. M. Brogan, of Seattle, reports excellent success in his preliminary work toward the development of a project on Willow creek, about twenty-four miles from Vale. This project was abandoned by the government for lack of funds and involves about 30,000 acres.

Charles M. Lanning, Joseph G. Houston and George Broughton have filed articles of incorporation of the Odin Falls Irrigation & Power Company. The capital stock is $90,000, with $30,000 of preferred stock. The papers cover general development work, as indicated by the name of the company.

The John Day Power Company, composed of Oregon and Washington irrigation enthusiasts, is preparing to develop the immense water power of John Day river, about 14 miles west of Arlington. The energy of this water, which has been idling away its strength for ages, will be converted into electricity and distributed over three or four counties.

In the Federal court at Portland the suit brought against the Three Sisters Irrigation Company, seeking to have its filing on a tract of 27,000 acres set aside, Justice Bean has handed down a decision favorable to the defendant. The court held that charges of misappropriation of moneys collected and failure to complete the irrigation system were not substantiated.

The reclamation of 20,000 acres on Quincy flat, near Wenatchee, is under consideration by people who have Holland capitalists interested, and engineers are working on the project with a view of giving the estimated cost of the work. Preliminary examinations of the water in the Columbia river have been made, and it is estimated that water can be thrown over all of the 20,000 acres.

Umatilla county capitalists are said to be interested in a project for the reclamation of about 12,000 acres near Weston. It is proposed to construct a storage reservoir on Pine creek about three miles above Weston, at a point known as Rocky Ford. By the construction of a dam 200 feet in height it is claimed that water for the irrigation of 1,800 acres may be stored. A power station will be installed and it is estimated that the total cost will reach $250,000.

Application for the appointment of a receiver for the Deschutes Irrigation & Power Company has been made by John G. Deshler, of Columbus, Ohio, but has been refused by Judge Bean, of Portland. It was alleged that the officials of the company are guilty of conspiracy, mismanagement, and breach of trust. To these charges the present officers of the company entered denial and in detail explained the financial operations of the concern and its prospect of meeting all obligations.

Will R. King, of Portland, is heading a group of capitalists who propose to construct a dam for power and irrigation purposes on the upper Klickitat river under the name of the Klickitat Valley Development Company. The point of diversion is about ten miles above Glenwood and water will be sent about eighty miles through flumes, to the Camas Prairie district where a tract of about forty-five square miles will be available for irrigation. It is claimed that the company has a paid up capital of $750,000.

MONTANA.

R. M. Calkins has recently purchased a tract of 22,000 acres of land lying about fifteen miles south of Harlowtown. He proposes to construct a system to irrigate about 4,000 acres of this tract.

It is reported that the irrigation project being constructed by W. B. Jordan and Hi. Gilmore on the Little Dry river is nearly completed, and that water will soon be turned on the 6,000 acres to be reclaimed by the work.

Edward Donlan of Thompson Falls has brought injunction suit against the Montana Copper Mining & Milling Company to prevent the latter company from using water from the Thompson river. Mr. Donlan proposes to use the supply for the irrigation of several thousand acres of land and claims a prior right.

WYOMING.

The Medicine Wheel Irrigation project, east of Lovell, has completed its preliminary surveys and will soon start active work. Denver capitalists are said to be backing Promoter Gregory.

A reorganization of the Shoshone River Canal Company with the expenditure of $2,000,000 for the development of the Oregon basin reservoir project, abandoned some years ago, is being considered by capitalists from Chicago, who are consulting with the state officials. It is proposed to reclaim 250,000 acres of land.

The Lake Hattie Water Company has been incorporated at Laramie by F. W. Mowen, N. E. Corthell and W. R. Smith, who are also the trustees for the first year. The company will have a capital of $150,000, and will engage in building the irrigation system now in course of construction at Lake Hattie to reclaim a large amount of Laramie valley lands.

Eastern capital is said to be interested in an irrigation project of magnitude in the Big Horn valley, Big Horn county. Land located on Chapman's Bench, known as the Sand Coule country, and aggregating about 40,000 acres, is available for irrigation. Water will be taken from Clark's

Fork river and carried through ditches to the distributing point. George E. Milligan of Rochester, N. Y., and Judge John Knapp of Canandaigua, N. Y., are said to be interested

The Secretary of the Interior is asking for proposals for building the Pathfinder dike in connection with the North Platte irrigation project, Nebraska-Wyoming. This dike will close a low place in the rim of the reservoir created by the Pathfinder dam. It is located about forty-five miles southwest of Casper, Wyo., and the work involves approximately 160,000 cubic yards of earth excavation, 8,000 cubic yards of pavement, and 2,000 cubic yards of concrete masonry. The bids will be opened at Denver, Colo., at the office of the Reclamation Service, on October 28, 1909.

MISCELLANEOUS.

Farmers on Muscatine Island, at Muscatine, Iowa, are becoming interested in irrigation by pumping owing to the drouth of the present year. Numerous wells will be sunk in the near future to insure a water supply next year.

Morton county, Kan., is now under investigation to determine whether or not water for irrigation can be supplied from artesian wells. It is represented that many thousands of acres of worthless land might be reclaimed through a system of deep wells similar to that at Garden City.

Because of the season's drouth, the Agricultural Experiment Station of Maryland is pursuing investigations as to the feasibility of using utilizing wells for irrigation. It is claimed that many thousands of acres in both Maryland and Virginia might be supplied with water to insure crops.

The Secretary of the Interior has awarded contract to the Chas. F. Elmes Company of Chicago for furnishing three 58-inch balanced valves for use in connection with the discharge pipes in Roosevelt Dam, Salt River project, Arizona. The valves are to be shipped in fifty-five, sixty and seventy days. The contract price is $13,890.

In response to requests from farmers in the vicinity of Rochester, N. Y., the Rochester Railway and Light Company is supplying power for experiments with deep-well irrigation. It is claimed that thus far the tests have been successful and that many land owners are planning to use its power in irrigating for farm crops.

J. N. Pharr of New Iberia, La., is said to be prime mover in a company now in process of formation and having for its object the irrigation of about 12,000 acres in the Brownsville district, about 300 miles west of Houston. It is proposed to name the company the Rio Grande Irrigation Company, and to capitalize at $4.000,000.

After investigation of the Keystone Irrigation Company and various other concerns operating in Keith and other western counties, State Engineer Simmons of Nebraska, has announced that the sale of water rights has far exceeded that available supply given the companies under the law. He has therefore taken steps to prohibit further sale of rights.

English capitalists are said to be supplying funds for the work necessary to complete for use the old Soule irrigation ditch, extending from Ingalls to Speakville in western Kansas. Taylor & Gilberts, engineers, are in charge of the work of dredging and extending the canal. When completed this ditch will supply water to 50,000 acres in Gray and Ford counties.

Stockholders of the recently organized Chapala Hydro-Electric and Irrigation Company of Guadalajara, Mexico, held a meeting and decided to issue bonds to the amount of 2,000,000 pesos in addition to the 3,000,000 pesos already authorized by the government. Additional funds will be used for the construction of a dike along the eastern edge of Lake Chapala.

Asking that George E. Barstow be enjoined from entering other suits against them, T. W. Crouch and others of St. Louis and A. N. Edwards of Kirkwood, Mo., have filed a petition in the federal court at El Paso, Texas. They further ask that a receiver be appointed for the Hillsdale Irrigation Company, the Pecos Land and Irrigation Company and the Barstow Irrigation Company.

To determine the status of water rights on the North Platte river, there has been instituted at Gering, Neb., a suit against the Tri-State Land Company. The Enterprise Irrigation district is the plaintiff, but it is understood that several districts have contributed to a fund to enter this suit. It is alleged that the Tri-State Company has no priority of water right except that necessary to supply about 2,000 acres. The latter company is of the opinion that it has rights sufficient to water about 80,000 acres. It is predicted that the legal battle will be fought with great bitterness by both sides.

Owners of rice lands in Arkansas have become interested in irrigation as applied to growing rice crops and numerous inquiries have been made as to the right to pump water from streams into irrigation ditches. Along the White river, where drouth is to be feared, there has been unusually large inquiry, and government experts declare that if only a small part of the projects under consideration is brought to maturity, there will be a material decrease in the volume of this stream. Prairie county rice growers are said to have become discouraged over the prospect and have turned to other methods for a water supply.

SHOPS SWAMPED WITH ORDERS.

Trump Company and Foos Gas Engine Company Compelled to Work Late Hours.

"We are simply swamped with orders," said Fuller Trump, Jr., of the Trump Manufacturing Company, makers of hydraulic and steam engines at Springfield, Ohio. "Our orders for the last three months exceed those of the entire previous year. The outlook for business is very promising."

Mr. Trump said that they had just made a big shipment to the west coast of Africa. Business seems to have taken a sudden spurt in all of the European countries, he said. This is an encouraging condition of affairs.

The Trump company is making shipments to many of the foreign countries as well as to various points in this country. The scarcity of men has handicapped the company some.

It is employing three shifts now and working until 10 o'clock at night so that it can get out its orders on time. For the last two months the factory has been running until 10 o'clock. More men are needed and the company has placed advertisements in the different newspapers announcing that workmen are needed at this plant. The company makes a specialty of designing turbines for water power plants and its catalog will prove of interest to those who contemplate the development of water power.

SOLD 10,000 GASOLINE ENGINES.

That would be a record which would be worthy of the ambition of the most enterprising gas engine company in the country. A plan whereby that many engines may be distributed necessitates some special inducement, not only in price, but in sending out an engine of quality, that will insure the purchaser of good work on an economical basis, without expensive repairs, troubles or delays.

The Witte Iron Works Company of Kansas City, Mo., have a new way of advertising their engines. While having advertised extensively in newspapers for years with good results, they have developed a plan which has particular reference to the sale of engines, in new localities, where at the present time the gas engine needs introduction. They state that experience has demonstrated the fact that one engine in operation will sell additional engines. As the returns of this kind of advertising depend altogether on the satisfactory services of the engine, their plan is one that will no doubt work out exceptionally well in the sale of high-grade engines.

They have only recently issued new catalogs, giving the history of their plant from the time when the firm first started in 1870 up to the present time, showing the progress that has been made and what has been gained by each engine advertising for itself. Their large new plant was recently completed and equipped, with an investment of over one quarter million dollars, and will enable them to turn out more than three times the number of engines per year than in the past.

They build all sizes, from 2 h. p. to 35 h. p., making a specialty of horizontal type engines in these sizes. Being exclusive manufacturers, who have devoted many years to the one line, it would indicate that they have attained a perfection in the engine, which every purchaser will appreciate. The details of their introductory proposition to introduce their engines in new localities will be forwarded to anyone who will write them, stating the size engine they want, or the class of work which they desire the engine to do.

Will pay for the IRRIGATION AGE $2.50 one year and the PRIMER OF IRRIGATION.

Supreme Court Decisions

Irrigation Cases

ADVERSE USER OF DITCH RIGHT.—

Adverse user of a ditch right of way over land for one year would not be sufficient to establish an easement therein.—*Oliver* v. *Burnett.* Court of Appeal, First District, California. 102 Pacific 223.

CONTROL OF WATER BY STATE.—

The constitution of this state reserves to the state the right to regulate and control the manner and means of appropriating the unappropriated waters of the state.—*Speer* v. *Stephenson,* State Engineer. Supreme Court of Idaho. 102 Pacific 365.

DUTY OF CANAL COMPANY.—

It is the duty of a canal company to turn the water for the consumer out of its main canal of lateral at such place as will be most convenient for the consumer, and will cause least waste by seepage and evaporation.—*Niday* v. *Barker.* Supreme Court of Idaho. 101 Pacific 254.

PRIORITIES.—

The order in which the names of the claimants were recited in the decree did not denote a determination of priority among them, especially as Mills' Ann. St. Sec. 2403, expressly allows the statement of claim required to be made by any one of the owners.—*Park* v. *Park.* Supreme Court of Colorado. 101 Pacific 403.

LANDLORD'S DUTY TO FURNISH WATER.—

Where a lease provided that the landlord should furnish water to irrigate the tenant's crops at a price to be hereafter agreed upon, and the price was agreed on for the years 1904 and 1905, the landlord's obligation to furnish water during those years was complete.—*Dunbar* v. *Montgomery.* Court of Civil Appeals of Texas. 119 Southwestern 907.

APPROPRIATION OF WATER.—

At such times as an appropriator is not using the water under his appropriation, and is not applying the water to a beneficial use, such water must be considered and treated as unappropriated public water of the state, and for such period of time is subject to appropriation and use by others.—*Hutchinson* v. *Watson Slough Ditch Co., Ltd.* Supreme Court of Idaho, 101 Pacific, 1059.

COSTS OF SURVEY BY STATE ENGINEER.—

The expenses incurred in making surveys, maps, and plats by the state engineer under the irrigation law and in obedience to an order of the trial court is a proper expense to be taxed up against the appropriators and claimants of water who are litigants in the case, and this may be done even though the maps, plats, and report be not introduced in evidence—*Farmers' Covoperative Ditch Co.* v. *Riverside Irrigating Dist., Ltd.,* Supreme Court of Idaho. 102 Pacific 481.

ACTION OF STATE ENGINEER.—

The action of the state engineer in deciding to cancel or in refusing to cancel a permit is not conclusive upon the parties, and may be reviewed in the district court upon appeal or may be questioned in a direct proceeding in the district court, and the court in considering such matter is in no way controlled or concluded by the action of the state engineer.—*Speer* v. *Stephenson,* State Engineer. Supreme Court of Idaho. 102 Pacific 365.

OLD AND NEW WATER.—

Under the apportionment of benefits, by reason of the purchase of said canal system, to the lands under it, the benefits were classified under two heads: One of "old water," and the other of "new water." The term "old water" refers to existing water rights at the time of the purchase of the canal, and "new water" refers to rights yet to be acquired by the enlargement of the canal, and no benefits under the head of "old water" were apportioned to respondent's land, and it appears that the canal has not been enlarged so as to acquire any "new water"; and, until such enlargement occurs, or it is made to appear that the canal company has water sufficient to supply the demands of respondent without interfering with the rights of prior users, he can not acquire a perpetual water right by the temporary use of water from said canal at times when prior users are not demanding the full amount of water to which they are entitled.—*Gerber* v. *Napa & Meridian Irr. Dist.* Supreme Court of Idaho. 100 Pacific 80.

CONTRACT FOR USE OF WATER.—

A contract for the use of water made for a valuable consideration organized for the purpose of supplying water for irrigating land that did not when made contravene the laws or policy of the state may, as between the parties or their successors in interest, be enforced, subject to all reasonable regulations, provided that the rights of other water users are not thereby unlawfully curtailed.—*Clague* v. *Tri-State Land Co.* Supreme Court of Nebraska. 121 Northwestern 570.

TITLE TO WATER BY USER.—

If the owner, by his agreement with his brother, or by making his statement of claim for the later water only, waived his right to any earlier water, the agreement with his brother that he was to have half of all water secured by both, followed by his open and notorious possession and use of it for over thirteen years thereafter for irrigation of his lands, vested the title therein in him, and caused it to go to his grantees with his land; oral agreements concerning priorities and title to water rights followed by change of possession and application of the water for irrigation by a claimant being valid.—*Park* v. *Park.* Supreme Court of Colorado. 101 Pacific 403.

USE OF STREAM FOR MECHANICAL PURPOSES.—

The owner of riparian land has the right to use the water in its natural course on the land for generating electric power, though the power is carried away and used on nonriparian land of others; and he has also the right, if it is more convenient and effective so to do, to turn the water out of its natural channel at the upper ends of his possessions, carry it in an artificial channel over the land, use it for generating such power, and turn it all back into the stream within his lands, provided such interference with natural conditions does not unduly injure those who have rights in the water, including the underflow.—*Mentone Irrigation Co.* v. *Redlands Electric Light & Power Co.* Supreme Court of California. 100 Pacific 1082.

DITCH RIGHT OF WAY ACROSS HOMESTEAD.—

Under Rev. St. U. S. secs. 2339, 2340 (U. S. Comp. St. 1901, p. 1437), providing that when, by priority of possession, rights to the use of water for agricultural purposes have vested, the owner thereof shall be protected, and confirming the right of way for the construction of ditches, etc., and providing that homesteads allowed shall be subject to any vested and accrued water rights to ditches in connection therewith, etc., one who completes a ditch across public lands for irrigation purposes, and who is in possession thereof at the time another makes his homestead entry on the lands, acquires a right of way across the lands, and the homesteader takes his homestead subject to such right of way.—*Cottonwood Ditch Co.* v. *Thom.* Supreme Court of Montana. 100 Pacific 825.

GRANT OF DESERT LANDS TO STATE FOR RECLAMATION.—

Act Aug. 18, 1894, c. 301, Sec. 4, 28 Stat. 422, as amended by Act June 11, 1896, Sec. 1, c. 420, 29 Stat. 413, and Act March 3, 1901, c. 853, Sec. 3, 31 Stat. 1188 (U. S. Comp. St. 1901, pp. 1554, 1556, 1557), for the purpose of aiding the public land states in the reclamation of desert lands therein and the sale thereof to actual settlers in tracts not exceeding 160 acres each, authorized the Secretary of the Interior, upon proper application of a state, and the filing of a map and approved plan of irrigation, to contract with it to donate and patent to such state not exceeding 1,000,000 acres as the state shall cause the same to be irrigated, reclaimed, and occupied. The state is authorized to enter into contracts to cause the lands to be irrigated and induce their settlement, to provide for a lien thereon for the actual cost and necessary expense of irrigation, but is required to hold any surplus money derived from their sale, in excess of the cost of reclamation, as a trust fund, and apply the same to the reclamation of other desert lands therein. Rev. St. Wyo. 1899,

(Continued on page 466.)

Land Values in Northwestern States

There are but three conditions which are making fruit land values throughout the northwestern states. They are climate and soil, irrigation, and expert horticultural supervision.

In the northwestern states by no means every section can count itself as being included in these three conditions. That fruit may properly develop and mature the conditions must be exactly favorable, and favorable conditions are not to be found except between certain degrees of altitude. Were the most perfect soil in the Northwest to be located above the 2,500-foot level, that soil would not be adapted to the proper cultivating of the apple or other deciduous fruits. It is true that trees, particularly the apple, will grow at that level, and it is true also that in many years a profitable crop can be produced, but at this altitude the hazard from frost is far too great to warrant the hope of great crops.

This statement removes from consideration probably ninety per cent of all the land in the three states of the Northwest. Of the ten per cent remaining which lay at a favorable altitude, another percentage must be deducted for soils not properly adapted to fruit culture. Still other percentages must be eliminated because of faulty planting and faulty care, due to lack of expert horticultural supervision. It is therefore a safe statement to make that, of the northwestern country, the land which would appear to be exactly adaptable to fruit culture is comparatively limited.

Many of the developed fruit projects, while having the proper soil and climatic conditions, have still not realized the extreme importance of the horticultural end, and perhaps none of them has so fully realized its importance as the Lewiston district, at Lewiston, Idaho.

The men who have done most at Lewiston for the promotion of fruit culture realized that success, or the lack of it, would be entirely due to the agricultural end. They were not unknowing of the fact that they had land of exceptional fertility, in the proper zone, and properly irrigated with a pressure system of water, and they turned their attention to the one other feature it would make for the success.

The Lewiston district scoured the West for the proper expert to put in charge of the horticultural problem, and from the University of California they engaged Prof. E. H. Twight, who, by years of experience, practical and theoretical, had made his name known in the West wherever fruit was mentioned. Prof. Twight organized at Lewiston a system of horticultural supervision, whereby no orchard is grown there except by his supervision and no work done except by his order.

Grape Cuttings in District Nursery.

The resident owners of young properties have at their command his advice and the advice of his subordinates and the non-resident property owner has his property cared for under his supervision. During the three years which this plan has been operative, every orchard at Lewiston has been as completely cared for as the best individual orchards in other districts.

Horticulturists from all the northwestern country look

Two Years and Six Months from Planting.

to the Lewiston district for their models of fruit culture. The last three years has demonstrated that it is possible to creat a fruit district where every orchard is horticulturally perfect.

Water Is Delivered Under Pressure to Each Five-Acre Tract.

THE DECADE BEFORE US.

We are more given to contemplating the past and trying to lift the veil that obscures the future than in actively solving the problems of the present hour. It is not strange that we should look with confidence toward the morrow; the past is gone forever, the present is measured by a heart beat, while the future is unlimited, stretching forward to eternity. While, as Dr. Johnson pointed out, it is not logical to "expect the promises of tomorrow to atone for the failures of today," it is wise to take roseate, if reasonable, views of the future, else present burdens and embarrassments might prove too heavy to be borne.

In its July circular, a prominent investment house, with no end of statistics at its disposal, and controlled, it must be admitted, by a decidedly optimistic spirit, undertakes to forecast the financial and economic conditions that may well prevail in this country in 1920. The following estimates, thus made, are of interest, though we may have to wait ten years to find out how far some of them are wrong. According to this financial prophet, our population, in 1920, will amount to a hundred million souls; our banking power will be thirty billion dollars; our bank clearings 193 billion dollars; our currency circulation four and one-fourth billion dollars; coal production 660 million tons; the pig iron output forty-six million dollars; gold production, 100 million dollars; imports of merchandise, one and one-half and exports of the same, two and one-fifth billion dollars; agricultural products, fourteen billion dollars; total wealth of the country, 175 billion dollars.

While usually more pleasing, foresight is by no means so reliable as "hindsight," as many have learned when balancing their books at the close of a year's business; yet, without discussing the "guesses" in detail, they may well turn out not exaggerations, considered as a whole. Conditions in this country are not only more favorable to advancement than ever before, but they are better than ever prevailed in any country on earth in the long stretch of time covered by authentic history. We possess a vast territory, rich in every blessing within the power of nature to bestow; a free government that places no restrictions on ambition and advancement; an ability to perfect labor-saving machinery perhaps unequaled in the world; isolation from other great nations, thus largely insuring peace; and, most important, perhaps, of all, the most ambitious, industrious and progressive people on earth. The federal government has adopted, and is fast developing, a system of reclaiming arid plains that, within the passing of the next decade, will enormously add to our national wealth, while broadening and enriching the field of human endeavor. This will, doubtlessly, be soon extended to include the drainage of rich swamp lands, of which we possess a sufficient area to form a European empire. Private corporations are already in the reclamation field and great states will soon heartily join in the movement destined to subdue and render fruitful the entire of our broad land. We stand at the threshold of prosperity and development. The past was but the prologue, the curtain is rising for the commencement of the real play.—[From The Banking World, July-Aug., 1909.]

They who live in the Empire of the West are, after all, in the very advance guard of progress. Nowhere else, perhaps, in this country, does the door of opportunity swing open so wide. There are, along the lines of the Union Pacific Railroad, chances for joining in the greatest enterprises known in the history of this country. Without disparaging other sections, it is safe to say that the west, today, is the land of opportunity and fortune for rich and poor alike.

(Continued from page 452.)

under the law. We must, then, go a step further and hold that the right to use water belongs to the user and not to the individual or association. We must agree, at some time, as to the facts that must be secured to establish a right to use, and then provide an administration to protect such a right when it is defined. But few states and territories have assumed to accept such a responsibility in even a small way, yet I can say from an experience of nearly twenty years in such administrative work, that it is no more difficult than are many other branches of executive work that have been assumed by the public and which are accepted without question as a proper responsibility of the public.

The history of the west during the past ten years is a sad commentary on the adequacy of state government in so far as the administration of our streams is concerned. The states and territories are not altogether to blame for this condition. Petty jealousies among those in high places, and the advice of men who have never had a day's experience in irrigation construction, the management of irrigation works or the administration of study of proper legal principles, have joined to complicate all attempts at reform in many legislatures. A propaganda was organized eight or ten years ago, which evidently had the support of the Reclamation Service, which has done more to defeat good irrigation legislation than any one other movement. Evidently the object of this crusade was to leave the states and territories at the mercy of the officers of the government. Threats were made that if certain laws were not enacted, but little would be done by the Reclamation Service. A general code was prepared and issued under the authority of the government, as an outline for the states and territories to follow. Under this, the director of the Geological Survey, then the head of the Reclamation Service, could dictate the appointment of state and territorial officers who were to be charged with the irrigation administration. The code recommended, was and is, in my judgment, of but little practical value. It has not worked successfully where it has been in operation. It does not define important principles, but provides for procedures which are complicated and, in many cases, impossible in practice.

We have done nothing, thus far, to encourage settlement along lines that will insure continued prosperity and build up great states. This is a work that we could with profit undertake. Let us outline some plan of action. Let us not claim that irrigation is to make homes on the land for the destitute of our great cities. We know that the best eastern farmer has trouble enough to maintain himself on a new farm in the west. How can we expect that a destitute family, without knowledge of agriculture of any kind, can succeed.

Is it not time that the National Irrigation Congress awake from its slumber? Should we not study fundamental principles and agree upon a platform setting forth their relative importance and their intrinsic value? Have we not had enough experience with moulders of public sentiment and with those who spend their time and energy before the doors of congress, when their real duty lies in the fields of the west?

If we have no work and no responsibility, let us muster the congress out of service. If we recognize that the water user needs laws and regulations which embrace only a few important principles, we can no longer spend our time and energy in promoting the personal interests of men who come here for selfish purposes and who have other objects than the protection of the irrigator at heart.

THE BROTHEN LEVEL.

In explanation of its device for determining the lay of the land, in making laterals and running lines for ditches, dams and canals, the Brothen Manufacturing Co., Ltd., of Mountain Home, Idaho, has recently placed on the press a booklet calculated to exploit the value of Mr. Brothen's apparatus. It is claimed that the Brothen level is a simple contrivance but of inestimable value for irrigators or others who wish to accurately determine levels.

IRRIGATION MADE EASY

with the **BROTHEN AUTOMATIC LEVEL**

Gives automatically the level or any grade desired, and will verify the correctness of its own work from where it is operated.

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HEAD GATES and HOISTS

is the most complete on the market, and we have patterns for all sizes and types. Don't forget that a reliable Head Gate is one of the important parts of any power plant.

Send for Catalogue 25.

The Dayton Globe Iron Works Co.

Dayton Ohio

BILLINGS IN GALA ATTIRE.

Green and white have been selected as the official colors of the Fourth Dry Farming Congress, which will meet at Billings, Mont., October 26-28. The entire scheme of decoration of the city as planned by the committee is designed to show combinations of these colors which have been selected as symbolical of the Congress and its work. The decorations will include numerous electric lights, fifty extra arc lamps being provided for the exposition hall and the principal streets. Hundreds of incandescent lamps will be strung across and along the centers of the streets and the buildings in the business district will be illuminated with extra lights. When the buildings are hung with green and white drapery, topped, as many will be, with the Stars and Stripes, and the lights are turned on, Billings will present a scene of brilliancy eclipsing all previous attempts to enhance its natural beauty.

"We will be there with the goods to surprise them" writes W. S. Pershing, an active members of the Congress, who lives at Limon, Colo., in the heart of a large dry farming district. Mr. Pershing has informed Prof. W. H. Olin, vice-president of the Congress, and superintendent of exhibits for the International Dry Farming Exposition, which will be held at Billings, Mont., October 25-29, that eastern Colorado will be well represented with exhibits which will show wonderful progress in the agricultural development of that state. He also assures large attendance of delegates from his section.

Mr. Pershing has attended a number of county fairs this fall in Colorado and reports that the exhibits there are unusually good. A number of these exhibits are expected to be brought to Billings, but there are many dry farmers who are preparing special exhibits exclusively for the Dry Farming Exposition, being inspired to extra effort by the offer of three trophy cups by the Denver Chamber of Commerce for Colorado exhibits. Mr. Pershing himself has been very successful this year, especially with his Silver Mine white oats, raised without irrigation on the eastern Colorado plains.

(Continued from page 450.)

storms are unknown and the disagreeable east wind is seldom experienced.

Hunting and fishing are to be enjoyed at their best in the valley and the mountains. Bear and wildcats furnish sport for the more daring, but feathered game is plenty and hunting bags are usually well filled. Streams in the valley abound in fish and brief excursions into the mountains usually bring a full basket of trout.

A matter of special interest to our readers is the announcement that the Bostrom-Brady Manufacturing Company, Manufacturers of the Bostrom Farm Level with Telescope, are now permanently located in St. Louis, Mo., a move made necessary by the unprecedented demand in this section of the country for an instrument of the unquestioned efficiency of the Bostrom Level, and we believe every land owner who has draining, ditching, irrigating, terracing, grading, road building to do, orchards to set out, fences to build, buildings and foundations to level, etc., etc., cannot possibly invest the amount at which this instrument is sold to better advantage. Read the manufacturer's card elsewhere in this issue and you will see their offer to ship c. o. d. subject to examination is a most liberal one, and the very best evidence that the manufacturers know to an absolute certainty their instrument fills to complete satisfaction a long felt want of hundreds of thousands of land owners who need equipment of this kind.

Send $2.50 for The Irrigation Age one year and The Primer of Irrigation

Do Your Farming with a **HART-PARR GAS TRACTOR**

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SAVE MEN—SAVE HORSES—SAVE MONEY—SAVE WORRY

The latest development in labor machinery is the **HART-PARR GAS TRACTOR,** which is revolutionizing farming methods. They displace many men and more horses, and are always ready for service and eat nothing when standing idle. Think what it means to have cheap power and plenty of it, always at your command. You can use these Tractors for plowing, discing, seeding, harvesting, threshing, hauling, hay baling, feed grinding, running irrigating pumps—in fact, all kinds of heavy farm work.

Hundreds in Successful Operation—Built in sizes of 30, 45 and 80 H. P.

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FIRE PROOF

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Our 48-Page Illustrated Catalog Tells You All About Them.

HART-PARR CO., 242 Lawler Street, Charles City, Iowa

JERSEY CALVES AS PREMIUMS.

President Colon C. Lillie of the National Dairy Show, to be held in Milwaukee, October 14 to 24, announces that he will give a Jersey bull calf to the creamery patron who sends in the best sample of milk, and a Jersey heifer calf to the hand separator cream patron who sends in the best sample of hand separator cream. Samples are to be taken by the regular man who receives the milk and cream at the creamery, the amount of the milk or cream delivered to be up to the usual amount. Applications for entry blank should be mailed to the National Dairy Show Association, Room 148, Plankinton House, Milwaukee, immediately.

REFORM BY LYING AND SLANDER.

President Taft's letter to Ballinger has hit hard the unco guid and rigidly righteous, who think that the proper way of reform is to lie about a public officer and stick to it.

Our inestimable contemporary, The Enquirer, is one caught with the goods.

At the irrigation congress where the Ballinger-Pinchot controversy broke out with great virulence, Dr. Pardee did more than shy his castor in the ring. His mouth got its tail over the lines and ran away. This catastrophe, for it is always a catastrophe when the Doctor's mouth gets errant, was caused as stated by him, by the restoration to the public domain of lands in Montana previously withdrawn as a national reserve. He charged that this restoration was done by Secretary Ballinger for the purpose of enabling a water-power trust to grab all the water powers in Montana, and that after such grab was grabbed, the Secretary renewed the withdrawal.

This charge was specific, circumstantial, and in detail. When it was made, a concerted howl went up from the chemically pure newspaper organs of what they themselves call "reform." Of course, in this chorus the inestimable Enquirer took a leading part, and notified the President to this effect: "If Taft stands by Secretary Ballinger, so much the worse for Taft."

Well, the President stands by Secretary Ballinger. He gives proof that not a single filing was made on a water power in the area restored to the public domain by the Secretary; that there were no water powers there to be grabbed; that instead of 15,000 acres it was charged the water-power trust had filed on to grab water power, there were filings on just 160 acres, on which there was no water power, and that these were not original but were refilings.

In other words, the President submits indisputable proof that the charges made by Dr. Pardee had not a shred, raveling, lint or fuzz of truth in them.

Thereupon, our interrogatory contemporary, The Enquirer, sticks to the exploded slander and says: "Mr. Taft may be a pacifier, but he cannot make peace by attempting to silence the independent Argus-eyed American press. Neither can he silence men like Dr. Pardee."

Wow! who said he could, or that he wants to? He can, as he has, prove their charges false, their statements perverted, their activity pernicious, their personality offensive, their methods malignant, their language venomous, their purposes venal; but silence them, no. Only one way was found to silence Ananias.—Oakland (Cal.) Tribune.

Mayer

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HIGH CUT BOOTS

Expressly adapted for irrigation work. Made of the highest quality and stock. Strong, comfortable and dependable. Many styles. Protect the feet and keep them dry. Can be secured through shoe dealers. If not obtainable, write to us.

For a dress shoe, wear "HONORBUILT"

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Books on Irrigation and Drainage

The *Irrigation Age* has established a book department for the benefit of its readers. Any of the following named books on Irrigation and Drainage will be forwarded, postpaid, on receipt of price:

Irrigation Institutions, Elwood Mead	$1.25
Irrigation Engineering, Herbert M. Wilson	4.00
The Primer of Irrigation, Anderson	2.00
Irrigation and Drainage, F. H. King	1.50
Irrigation for Farm and Garden, Stewart	1.00
Irrigating the Farm, Wilcox	2.00
Practical Irrigation, Aug. J. Bowie	3.00
Practical Design of Irrigation Works, W. G. Bligh	6.00
Irrigation (as a branch of engineering), Hanbury Brown	5.00
Earth Slopes, Retaining Walls and Dams, Chas. Prelini	2.00
Road Preservation and Dust Prevention, Wm. P. Judson	1.50
Practical Farm Drainage, Chas. G. Elliott	1.50
Drainage for Profit and Health, Waring	1.00
Farm Drainage, French	1.00
Land Drainage, Miles	1.00
Tile Drainage, Chamberlain	.40
Cement Pipe & Tile, Hanson	1.00

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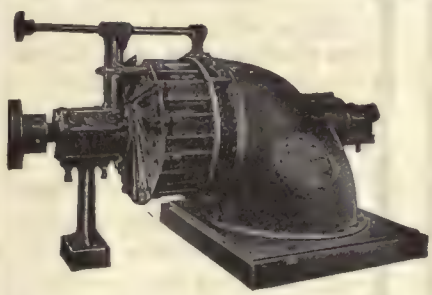

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When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the HIGH SPEED of the SAMSON, for a given power, lighter and consequently CHEAPER transmission machinery can be used.

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Write Department K-2 for Catalog.

SENATORS PLAN SECOND TRIP

Committee from United States Senate Will Make Journey to Southwestern Projects.

It is announced that the senatorial committee on irrigation and reclamation of public lands is planning to meet for its second trip at Denver on October 31. On the following day they will visit the Gunnison tunnel and after making an investigation as to conditions will go to Grand Junction.

Several of the members of this committee were unable to make the trip during August, because of personal business or matters that compelled them to remain in the East. From present indications, it is stated, nearly the full committee will meet at Denver for the inspection of projects in Colorado, Utah, California and New Mexico.

As at present outlined, the itinerary of the November tour is as follows: Gunnison project, Nov. 1; Grand Junction, Nov. 2; Salt Lake, Nov. 3; Nevada, Nov. 4 and 5; California and Sacremento Valley projects, Nov 7 and 8; Klamath, Ore., Nov. 9; San Francisco, Nov. 10; Los Angeles, Nov. 11; Imperial Valley, Cal., Nov. 12; Yuma, Nov. 13; Roosevelt Dam project, Ariz., Nov. 14; El Paso, Nov. 16; Santa Fe, N. M., Nov. 18.

The committee will return to Chicago on Nov. 20.

REPORT ON BELLE FOURCHE.

Supervising Engineer I. W. McConnell, who has charge of Government reclamation in South Dakota, states that about 25,000 acres of land under the Belle Fourche project were irrigated this year. The storage reservoir has not yet reached a stage where it can be utilized. The Belle Fourche dam, which will be the largest earthen dam in existence, is about 60 per cent completed, and at the end of the present year the gap in the embankment at Owl Creek will probably be closed. Next year stored water will doubtless be available for all the lands which are at present under canals. Under the Outlet canal there are 12,000 acres at the present time; under the South canal about 16,000 acres; and under the Indian Creek lateral of the North canal there will be 16,000 acres. The irrigation carried on this year was by direct diversions from the Belle Fourche river, and the supply was sufficient.

The Northwestern Railroad has secured a right of way for a line to extend from Belle Fourche to Pierre, which will give transportation for all points in the project, with no haul exceeding ten miles. The company promises to complete this road within a year.

A SATISFACTORY WATER SUPPLY

ALWAYS PAYS DIVIDENDS

A Humphryes' Hydraulic Ram will furnish you, when installed, with a permanent and automatic water supply Why spend money on costly pumping plants and time, strength and expense in operating same, when a Hydraulic Ram will lift your water and deliver it with absolutely no expense. The Humphryes' Pneumatic System will supply your residence with water under pressure for all domestic purposes and give service heretofore obtainable only with an elevated tank or direct connection with municipal water works. Our New Catalog "Domestic Water Supplies" tells you all about the HYDRAULIC RAM and PNEUMATIC SYSTEM and will be mailed you upon request.

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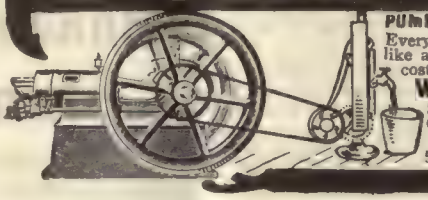

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DISCUSSES RECLAMATION.

President Taft Indorses $10,000,000 Bond Issue for Completion of Works.

Reclamation of the arid and semi-arid lands by irrigation was discussed at length by President Taft, on Sept. 28. He unreservedly indorsed the work of Richard A. Ballinger, Secretary of the Interior.

In discussing problems before the Reclamation Department, he said in part:

"The reclamation act provides for the expenditure of funds made up of the proceeds of the sale of public lands and reimbursed from time to time by the installments to be paid by the settlers who take up the irrigated land, and it also provides that no part of a project is to be contracted for or begun until the money for the completion of that part of the project contracted for shall be in the reclamation fund.

"Now, it appears that it will take $10,000,000 or more, which is not available in the reclamation fund at present, fully to complete the projects, and it also appears that a great number of persons by reason of the beginning of the projects have been led into the making of settlements, the expenditure of time and labor, with the hope and upon the reliance that such reclamation enterprises would be carried through in reasonable time.

"I think there is no doubt that it was the intention of Congress that projects should not be multiplied in such a way that they could not be completed within a reasonable time out of the reclamation funds provided by the sale of public lands, and it would probably have been wiser to adhere strictly to the limitation thus construed, even though the language of the act, by dividing up the projects into parts in terms seemed to permit the beginning of more projects than there was likely to be money enough to complete within a reasonable time.

"The pressure was doubtless very great, and the reclamation service yielded to the pressure within the letter of the law, and now find themselves in the situation described.

"But something must be done to relieve the present situation, which is one of disappointed hopes to many settlers upon the arid lands who, counting upon an early completion of the projects undertaken, have invested their money and spent their time and seemed to be no nearer the goal of satisfactory irrigation than they were when the projects were begun.

"I think it wise to apply to Congress for relief by urging passage of an enabling act which shall permit the Secretary of the Interior to issue bonds in the sum of $10,000,000 or more, to complete all the projects now projected.

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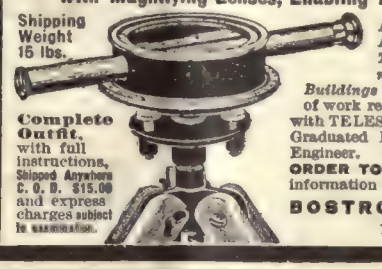

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(Continued from page 458.)

Sec. 934 et seq., provide for the acceptance of such grant, and vest the selection, management, and disposal of the lands in a State Board of Land Commissioners, and authorize the board to enter into contracts with any person or corporation proposing to reclaim lands, which contracts shall contain complete specifications of the proposed irrigation work, and its estimated cost, and the price and terms per acre at which such works with perpetual water rights shall be sold to settlers, with the price and terms on which the land will be sold by the state to settlers, "provided that such price and terms for irrigation works, water rights and for lands to be disposed of by the state to settlers shall in all cases be reasonable and just." They require the board immediately on the commencement of work by a contractor to give notice by publication in the county in which the land is situated that said land is open for settlement, the price at which it will be sold to settlers by the state, and the contract price at which settlers can purchase perpetual water rights. *Held*, that a contract made by a company which intended to, and afterward did, obtain a license from the board to construct irrigation works covering certain lands, by which it gave to a third person the exclusive right to make contracts with settlers on such lands on its behalf for perpetual water rights, at not less than $19 nor more than $30 per acre, in his discretion, and to give him all that was obtained above $19 per acre, was contrary to the intent of the law and to public policy, and would not be enforced in equity, since it not only violated the requirement of the law that the charge should in all cases be just and reasonable, but made it impossible for the board to give the required notice of the price at which such water rights would be sold to settlers, and disenabled the company from performing the function contemplated by the grant from the state by contracting with settlers, leaving such function to be exercised arbitrarily by the other party to the contract.—*McKinney* v. *Big Horn Basin Development Co.* U. S. Circuit Court of Appeals. 167 Federal 770.

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Landseekers' Information Bureau,

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N. B.—The winter weather in the Basin Country is fine and lands can usually be seen to advantage all Winter.

MANY STATES INTERESTED.

Many of the states are taking an interest in the Colorado National Apple Exposition. This interest will mean a very lively competition for the prizes that are to be offered and assures the success of the show from an exhibition standpoint.

The various states that are contemplating making exhibits at the big national show are now reserving space. Every consideration and concession possible will be offered to those sections by the Colorado people, as the larger the competition the more valuable will be the demonstration of what can be done in apple growing in America.

Free storage has been provided for all exhibits in less than carload classes, but in consideration of the large prizes for these exhibits and the commercial value to the exhibitor of having a show at the time of the Western Fruit Jobbers' Convention, it was deemed advisable not to store the car loads free, because of the immense amount of space that would be taken by growers who had in mind the increase they were to get in the price of their product more than the exhibition feature.

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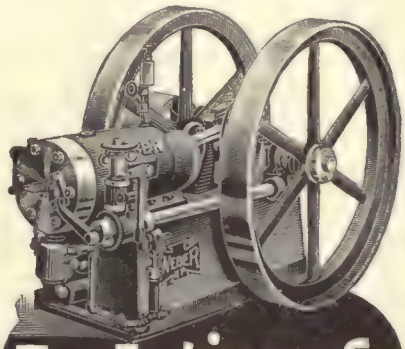

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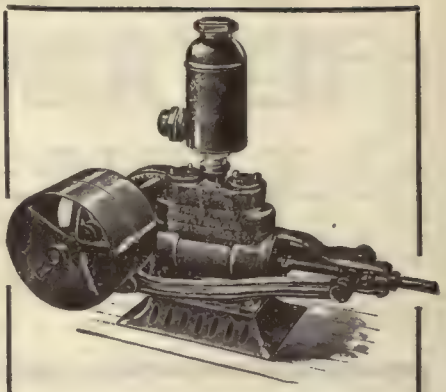

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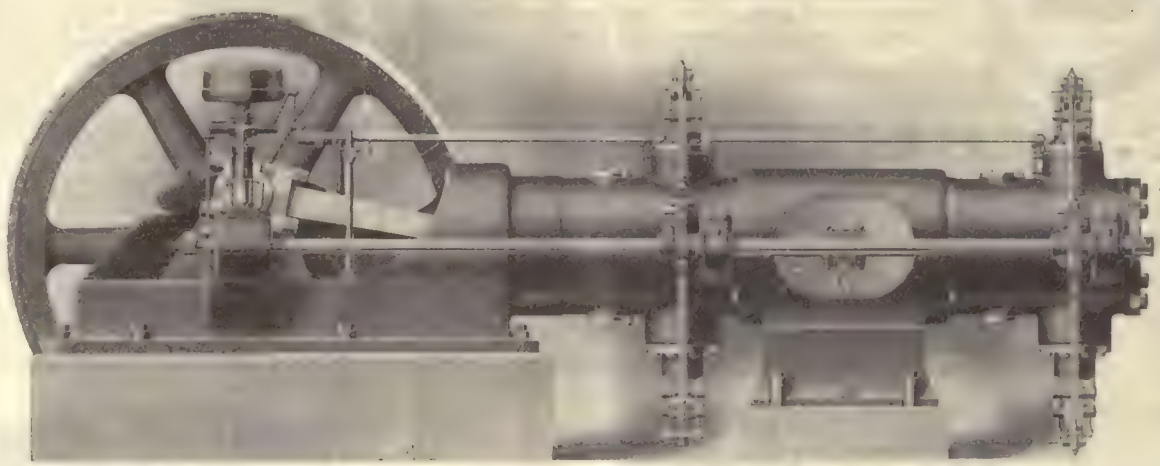

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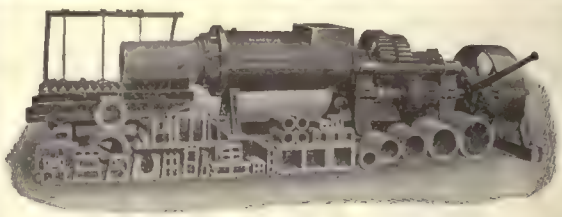

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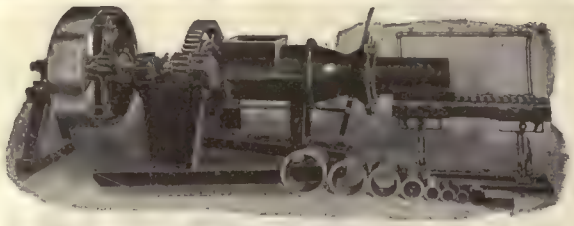

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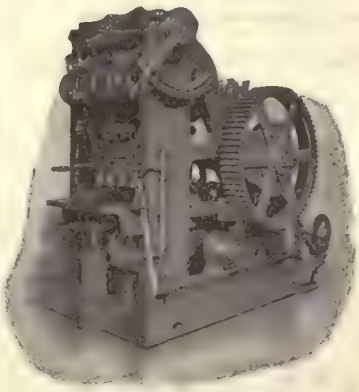

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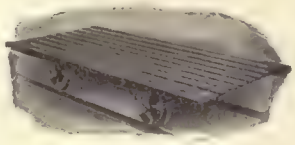

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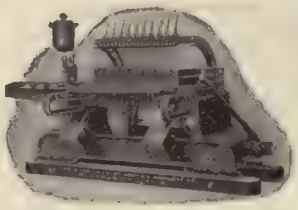

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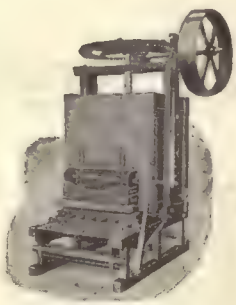

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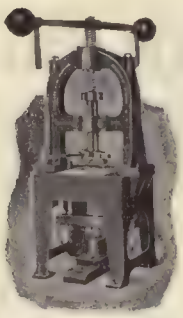

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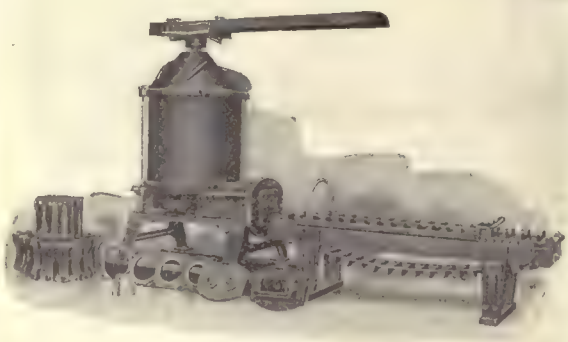

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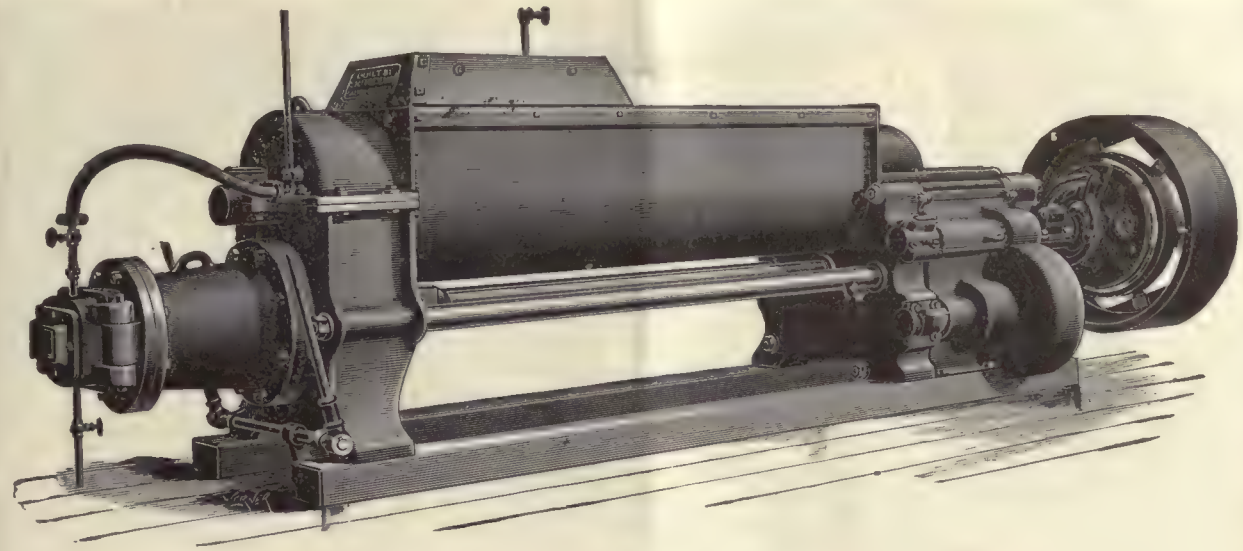

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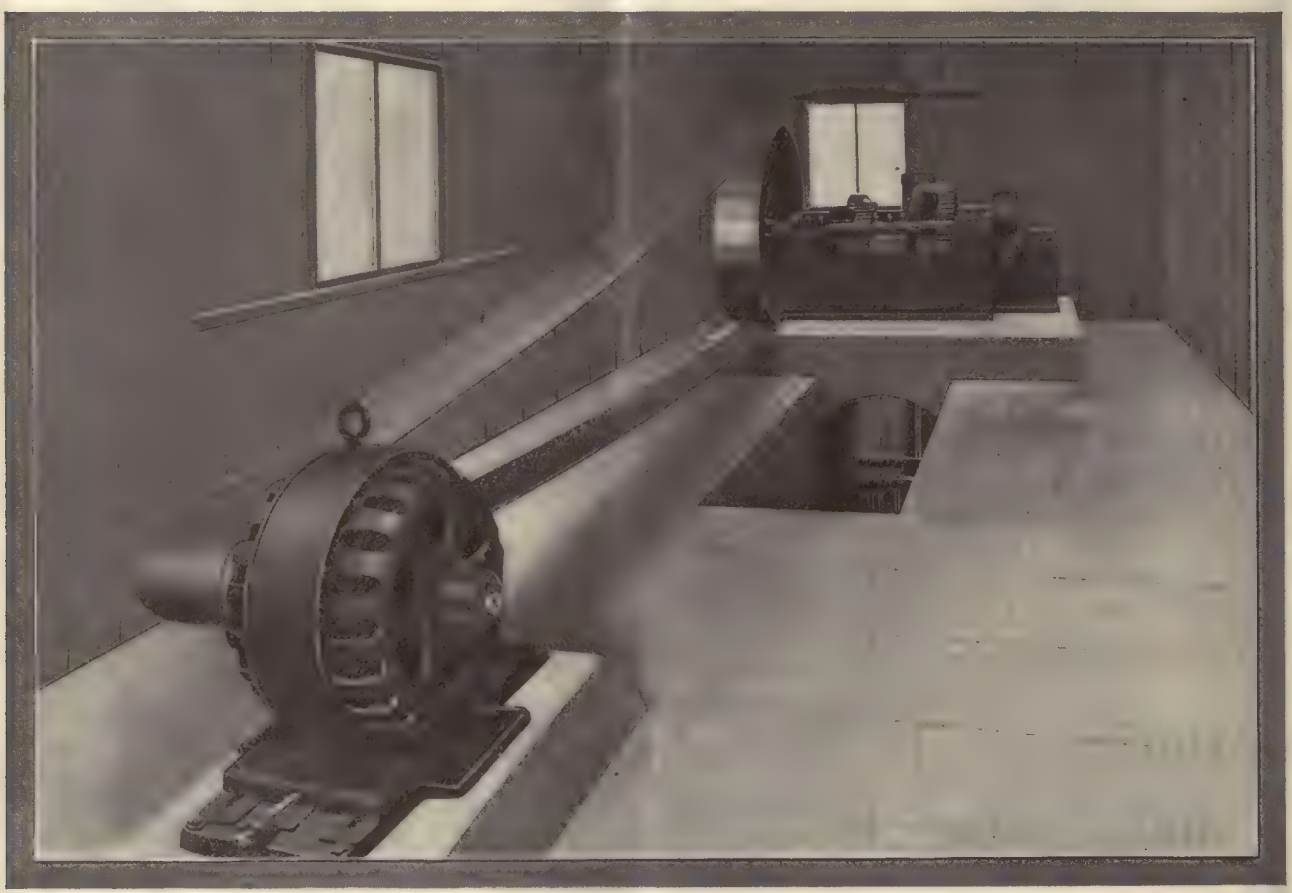

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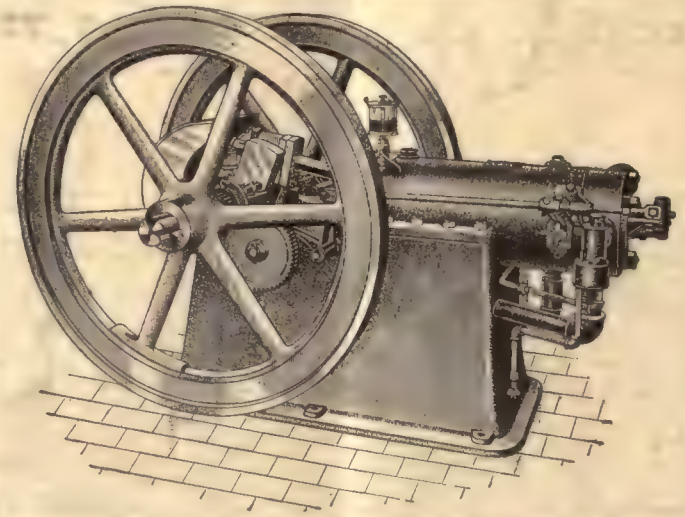

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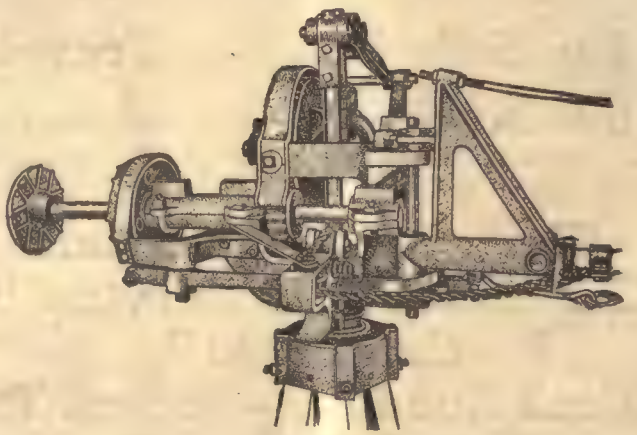

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